Online Licensing System
For
Pharmaceutical Service Division, Ministry of Health

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Declaration

I declare that this final year project is my own work and has not been submitted in any form for another degree or diploma at any other University or Institute of tertiary education. Information derived from the published and unpublished work of others has been acknowledged in the text.

Subashini Ramakrishnan
10 September , 2001

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SUBASHINI RAMAKRISHNAN
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ABSTRACT

Internet has often been referred to as the 'Information Superhighway'. The concept of being able to access information quickly and easily led to the vision of the Internet. It provides, uses or makes accessible, either publicly or privately; high level services layered on the communications and related infrastructure.

With the advancement of information technology and increasing number of users getting connected to the Internet, various techniques are being employed on the World Wide Web (WWW). It provides sustaining facility accessible to hundreds of million of people worldwide.

Therefore, the Online Licensing System is expected to provide value-added services (pharmacists, wholesalers, manufacturers and importers of medicines) and at the same time enhancing the features of current state of their existing web page. Furthermore, at current situation, there is no such existing online web-based licensing system being used in Malaysia.

The Online Licensing System for Pharmacy Division, Ministry of Health (MOH) will focus on resolving the drawbacks of the conventional manual licensing process. In overall, this web-based online application will help to automate the licensing process in a more systematic and easier way.

Introduction

1. INTRODUCTION

1.1 Motivation for the Project

The Internet is a global system of networked computers together with their users and data infrastructure. The increasing number of users getting connected to the Internet everyday has made Internet a significant market space with the WWW as the fastest growing part of it.

Today, the Internet is a public and self-sustaining facility accessible to hundreds of million of people worldwide[6]. So, by integrating the online licensing capabilities in current Ministry of Health (Pharmacy Division) web page will enable added value services to customers (pharmacists, wholesalers, manufacturers and importers of medicines) and at the same time enhancing the features of current state of their existing web page. Furthermore, at current situation, there is no such existing online web-based licensing system being used in Malaysia.

The Licensing System for Pharmacy Division, Ministry of Health (MOH) is a web-based online application, which is developed to automate the licensing process via the Internet. The user-friendly interface allows the new applicants and existing license holders to apply and renew licenses in a more systematic and easier way. The main strength of this system is undeniable as it utilizes the state-of art form of information dissemination in this era, the Internet.

1.2 Project Overview

Internet has often been referred to as the 'Information Superhighway'. The concept of being able to access information quickly and easily led to the vision of the Internet. It provides, uses or makes accessible, either publicly or privately; high level services layered on the communications and related infrastructure.

The conventional way of license application/renewal is done manually especially in government sectors in Malaysia. Currently, all the information is kept in the record book and being keyed in into the computers. Moreover, the applicants need to call, mail or fax their application to the nearest MOH branch. This method is not only inefficient but also very time consuming. This is very obvious as the conventional method of license application and renewal generates a large number of papers, phone calls and faxes. In order to perform those tasks, adequate employees need to be assigned to handle the faxes and in answering phone calls. In addition to lowering transaction costs, the Internet is transforming the market place into a global environment in which business and consumers are no longer restricted by their geographical location.

Thus, this system is expected to resolve and minimize the drawbacks stated above. With the implementation of this online system, the applicants and existing license holders no longer need to present personally to appropriate MOH branches or send applications through mail or fax. The main

consideration in this system design principle is based on the requirement of manageability, ease of use and flexibility.

Therefore, the development of this system will not only improve the efficiency and service quality but also reduce errors due to conventional manual processing.

1.3 Project Objectives

Generally, the Online Licensing System is developed to meet these objectives: -

- To maximize the usage of the available technology, sources, hardware and software tools in order to develop a systematic and efficient system.
- To create computerized system that will allow the manufacturers, wholesalers and importers of medicines apply and renew their licenses with the help of computers.
- To create paperless office environment whereby the paper documents are replaced with the electronic documents.
- To implement queries capabilities to enable the users search for the nearest MOH branch and licensed premises in Malaysia.
- The produce a user-friendly system with nice graphed screens and readable fonts. It will be carefully programmed to make sure novice users have all the directions and information on what to do when they get into the system.

- To enhance the Ministry of Health's homepage with online licensing capabilities.

1.4 Project Scope

The project scope is established to ensure the system meets its requirements. The intended users of this system are pharmacists, manufacturers, wholesalers and importers of medicines. Basically the project scopes are: -

- To develop a centralized web-based licensing system that can be accessed by all the manufacturers, wholesalers and importers of medicines all over Malaysia.
- To facilitate the license application and renewal process by the users.
- To enable the users search for the nearest MOH office and licensed premises in Malaysia to deal with their license application, renewal and other related matter.
- To provide facilities where the users can view the statistics of the license issued/cancelled by year.
- To enable the administrator to view, edit and delete the new applicants details, license renewal details and feedback sent by the users.

1.5 Project Schedule

This project will actually be carried out in two phases. The first phase of the project involves the project planning, analysis and design. The next phase involves the system coding, testing and implementation.

Time-line of the project is scheduled as in ***Figure 1.1***

Project Schedule for Online Licensing System

(March 2001 - September 2001)

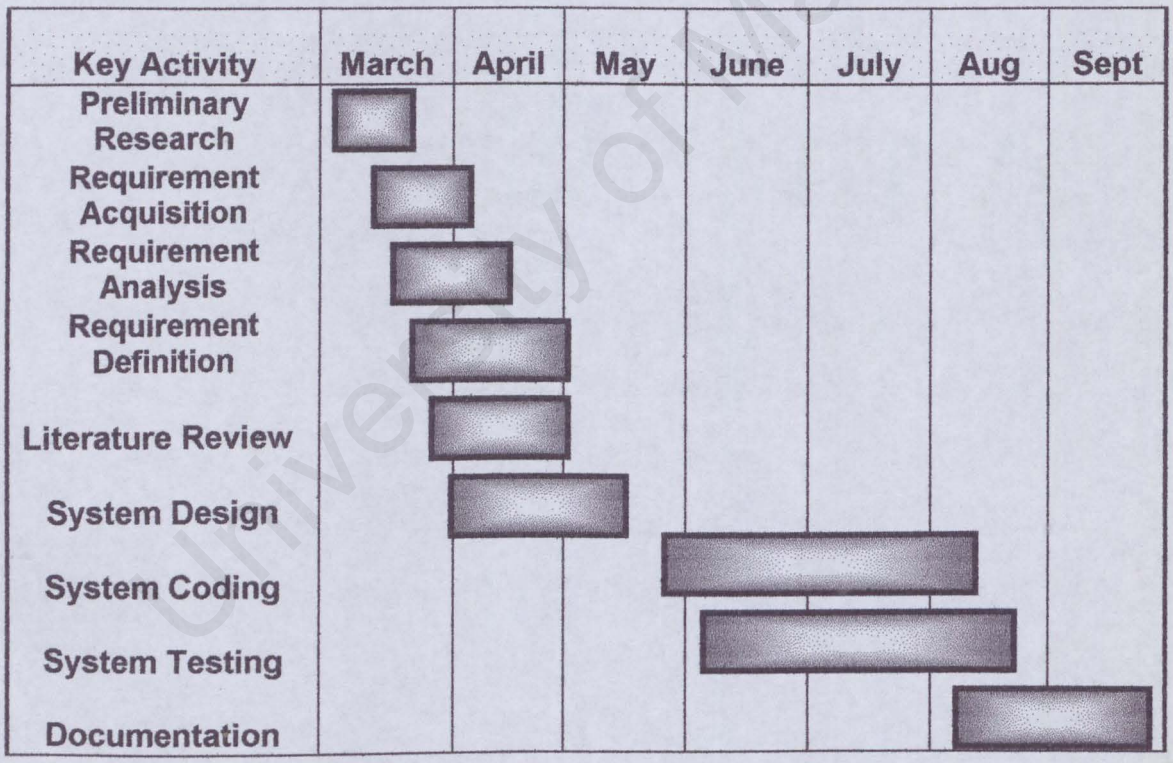


Figure 1.1 Project Schedule

Literature Review

2 Literature Review

2.1 Finding

This is an important stage in system development. At this stage, analysis and synthesis of the system will be carried out to ensure the understanding of the system. In search of useful, informative and firm requirement, the finding of all the information must cover broad areas of fields. It must have strong relevancy in what is being discussed. Moreover, it is very important to avoid any information repetition and eventually put on redundancy.

In the process of developing the Online Licensing System, researches and interviews with the licensing officers had been conducted to understand the non-computerized system. This helps system developer to get a clear view of the licensing process being carried out by the Pharmacy Division, MOH.

In order to develop an efficient and systematic system, it is very important to learn the current existing system and modify it to enhance the system into a more powerful and beneficial features for the project. Also, it is a meant to sufficiently deliver the knowledge of the strengths and limitations of several development tools so that the best suitable tool can be chosen to developed the proposed system.

Besides that, researches have also been done on the evolution network computing from early days of client/server computing to present development.

2.1.1 Definition

As depicted from the 'OXFORD Advanced Learner's Dictionary', *license* is defined as an official document showing that permission has been given to do, own or use something[13]

Licensing under existing legislation is to ensure the import, storage, sale and supply are carried out by qualified or fit persons complying with the provisions of the laws[7]. The licensing process can be referred to the issuance of various types of licenses; driving license, software license and poison license. Basically, the purpose of licensing and enforcement activity being carried out by MOH is to enforce legislation to regulate the practice of pharmacy, the importation, distribution and manufacture of medicines (including those containing scheduled poison and dangerous)[7]

According the **Poison Ordinance, 1952,** Medical and Health Services of any state duly appointed in writing by the Director General of Health to be a licensing officer of any state or the Federal Territory may issue licenses for

the purposes of the Act. Currently these are the licenses being issued by the Pharmaceutical Services Division under the **Poisons Act 1952** and **Poisons Regulations (Sodium Hydroxide) 1962**[8]

Table 2.1 Type of Licenses issued by Pharmaceutical Division

Type A License	-for registered pharmacists to deal generally with all poisons Fee -free
Type B License	-for any person whom the licensing officer may consider fit and proper person to hold such license, or issued to a responsible officer of a company incorporated under the Companies Act 1965 to import, store and sell by wholesale such poisons (not being a group A Poison) as may be specified in such license. Fee -RM100
Type D License	-for any person whom the licensing officer may consider fit and proper person to hold such license, to store and sell by retail such Part II Poisons as may be specified in such license. Fee -RM20
Type E License	-for any person who in the course of his business uses Sodium Hydroxide in such substantial quantity that the licensing officer deems it appropriate to issue to him a license, to import, store and use Sodium Hydroxide. Fee -RM100

Sodium Hydroxide Permit	- to buy, store and use Sodium Hydroxide Fee -RM20

Basically, the licensing process involved in the proposed system consists of these three categories: -

a. License/Permit Application

The process begins when the applicant submits license application form according to the type of license/permit. Upon receipt of the application form and supporting documentation, the Pharmacy division officer will verify all necessary details of the applicant. The Pharmacy will also notify the applicant if discrepancies arise or clarification is needed[10].

Based on the officer review, Pharmacy Division determines if an on-site inspection (except license type A) is required. Inspections may be required as part of the initial application process.

If the result is satisfactory, the appropriate license will be issued. The Licensing Officer may in issuing a permit under this regulation impose such terms and conditions as he thinks fit, and may from time to time vary the terms and conditions so imposed.

Every license, issued under this Act by a Licensing Officer for any State in such State, shall be numbered consecutively in respect of each type and of the year in which it was issued.

The applicants need to pay the fee according to the type of License applied. The whole license application process will take at least three weeks.

b. License Renewal

All the licenses issued by the Pharmacy Division are valid for a specified period not exceeding twelve months[7]. Therefore, the licenses need to be renewed according to the license type. For example, a sodium hydroxide permit holder needs to renew his/her permit annually. Once the applicant submits the license renewal application, the licensing officer will update the registration information and do re-verification of licensure status.

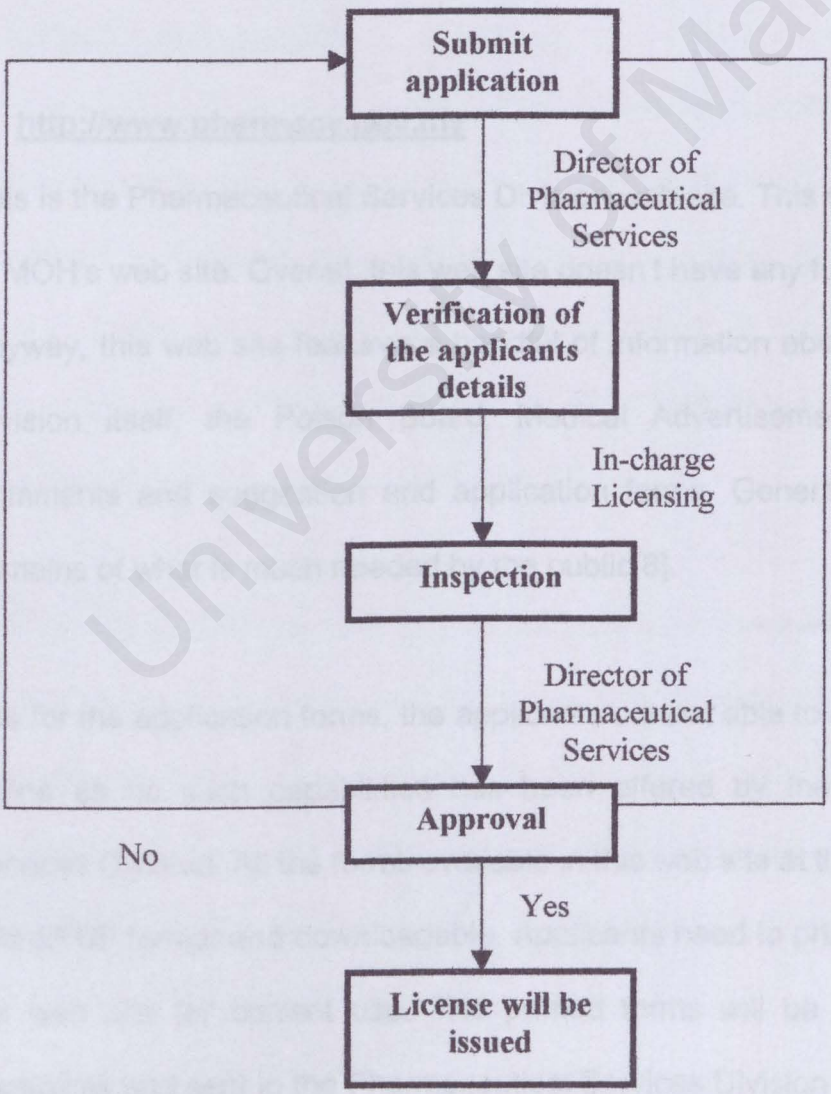
c. License Cancellation

The Licensing Officer for each State shall keep a register of licenses issued by showing all the particulars of each license issued, and the entries in such register shall be numbered to correspond with the serial numbers of the licenses and there shall be noted in the register, in the event of the cancellation of any license, the date of such cancellation.

The Licensing Officer may cancel any license/permit issued under this regulation, if he is satisfied that –

- the holder of the license/permit has contravened any provisions of these Regulations or any terms and conditions imposed by the Licensing Officer; or
- the holder of the license/permit has furnished false, misleading or inaccurate information, or has concealed or failed to disclose materials facts, in his application for such permit[8].

Figure 2.1 **The general procedure in license application/renewal process**



2.2 Analysis of existing System

Information found in the Internet is diverse, ample and informative. In order to gain better understanding on this field, few web sites have been selected and examined. It has its own good and bad of course but all the information and data from these web sites give ideas and whole concept of what a licensing related web site should have. Listed below are some of the related web sites that had been observed and analyzed for an overview of current licensing system.

- **http://www.pharmacy.gov.my**

This is the Pharmaceutical Services Division web site. This site is also linked to MOH's web site. Overall, this web site doesn't have any functional module. Anyway, this web site features a handful of information about the Pharmacy Division itself, the Poison Board, Medical Advertisement Board, FAQ, Comments and suggestion and application forms. Generally, it covers all domains of what is much needed by the public[8].

As for the application forms, the applicants are not able to apply the license online as no such capabilities has been offered by the Pharmaceutical Services Division. All the forms available in this web site at the moment are in Word/PDF format and downloadable. Applicants need to print the forms from the web site for current use. The printed forms will be filled up by the applicants and sent to the Pharmaceutical Services Division by mail or fax.

Instead of inability to perform online application, the list of forms displayed is not well organized. Proper guidance is not available to assist the users while navigating this site.

In overall, only certain parts of these web page layouts will be adopted for usage and no functional module from this web site could be used for the proposed system.

- **http://www.nabp.net/**

This is a web site, which provides link to Verified Internet Pharmacy Practice. This web site is actually developed by the National Association of Boards of Pharmacy in response to public and regulatory agency concerns regarding safety of Pharmacy Practices. It provides online pharmacy facilities that comply with the licensing and inspection requirement for each state to which they dispense pharmaceutical services[10].

It is basically a simple web site without any functional module. Thus, not many features could be adopted for usage in the proposed system. However, this web site offers a great deal of non-functional module section such as instructions for new users when they get into the system, application forms which are currently in Word format (need to be downloaded and printed), program fees and seal quality.

Anyway, the inability to apply licenses online has made the performance of this site deteriorated tremendously as downloading files will need more time and resources especially for customers that used slow network connection. Therefore, in the proposed system, it is expected to provide online application capability to enable the applicants perform their tasks in more efficient way.

- **http://www.napraonline.com**

This is one of the best web sites found so far on the Internet for its online licensing capabilities. The North American Pari-Mutuel Regulators Association (NAPRA) is a tax exempt organization which was incorporated as a Kansas non-profit corporation on June 28, 1997[9].

Even though this is not a pharmaceutical service related site, the features in this site especially its online licensing capabilities are very helpful and informative. This web site provides online multi-jurisdictional license application facilities, which allows owners, trainers and jockeys to submit license application electronically to several jurisdictional simultaneously.

Design of the web site is of utmost simplicity and quite a user-friendly interface provided. A consistency usage of color, font size, graphics and functional modules obviously shows that a standard user interface is deployed across all web pages.

NAPRA Online license is designed to make the licensing procedure easier for the licensee as well as the jurisdiction. In just a few minutes, licensees can answer application questions, email the application to the respective jurisdiction, and print out a local copy for their own records.

When users click on the "Online License Application" link on the NAPRA's home page, the users will be able to access the web page containing all necessary details about the online system. After clicking on the "Let's Get Started" link in that page, the users will be prompted with a list of NAPRA jurisdictions. Next, the users have to click on the checkbox to the left of the jurisdiction for which they require licensing. If the users want to apply for a license in more than one jurisdiction they can click on multiple check boxes. After clicking the 'Next' button they will be prompted with a few pages of application questions which can be answered online.

Once the users have answered all of the questions they will have opportunity to review their application. If everything appears to be in order, they simply have to click the 'Next' button to automatically email the application to the appropriate jurisdiction.

As conclusion, many great features in the napraonline.com web site will be adopted in the development of the proposed system. Even though this site is the most suitable model for the proposed system, lots of modifications; e.g.

license renewal and cancellation will need to be done to further enhance certain aspects of the online licensing system.

2.3 Synthesis

Based on the observation and evaluation made on the existing systems, lots of inconvenience and weaknesses have been discovered especially in the aspect of online licensing capabilities. So far (at the moment of writing this report), there is no profound web sites in Malaysia that is available in the internet offering acceptable quality and value-added services of online licensing capabilities. However the information and knowledge gained from foreign web sites such as napraonline.com will be taken into consideration in the development of proposed system. Therefore, this project will set its ultimate goal to provide and deliver value-added services for license applicants and Pharmaceutical Service Division, Ministry of Health.

In overall, the proposed system is expected to have these features: -

- **Good interface design**

The interface design is so vital as users will judge whatever they see at their first glance. Therefore, important features such as color, font size and graphic need to be paid attention. Color is an appealing and proven way to facilitate computer input[6]. Thus, an appropriate use of colors on display is necessary. The basic is, there can't be more than four to five separate colors in a window and not more than seven in a system interface. Thus, a proper selection of color can help the users to understand and manage complexity.

Font size is another criteria that should be taken into consideration while designing an interface. Basically, a good interface must consists of few types of fonts with different sizes. Different styles enhance differentiation among categories. Graphics and icon usage as a way of exposing relationships which are not obvious from the raw Icons serve functions similar to these of words and may replace them in many menus, since their meaning is more quickly grasped than words.

- **Good division of sections**

Since there are many sections need to be covered in the web page, proper division has to be done. The proposed system is expected to have few major sections with many subsections under it.

- **Good Links**

Information evolves through time and we can't cope it only under one roof. So, we need links that can connect us to other informational sites that can explain other things to us. In the proposed system, links to other related sites will be included.

- **Easy and Fast Downloading**

Excessive graphics and pictures are not good as downloading images will need more time and resources especially for customers that used a slow network connection. Due to this matter, the system being developed will only consist of important and relevant graphics.

2.4 Summarization

Basically, most of the literature survey is done by conducting interviews with the licensing officers, MOH Annual Report and by surfing the Internet.

The outcome from the interview conducted with licensing officers from the Pharmaceutical Service Division did help to collect requirement specification besides giving clear view of the non-computerized licensing procedure being carried out by the Pharmacy Division. Furthermore, it helps to give better idea about the current system's weaknesses and drawbacks.

Besides that, the MOH's Annual Report and other licensing-related books had also been analyzed to gain better understanding about the enforcement and licensing process. Reviews from the Internet had obviously given broad idea and perception about the current existing licensing system.

Therefore, the proposed system will be developed based on the information and knowledge captured from those reviews in order to provide a quality and value-added service for both Pharmaceutical Service Division and public.

System Analysis

3. System Analysis

System analysis is an important part in software development phase. It comprises of identifying the problem area, opportunities and objectives, gathering information, understanding the proposed system and determining information requirements and selecting the best alternative available[5].

3.1 System Methodology

The main purpose of this part is to give enough confidence to the readers or supervisor on the feasibility of the project. The quality of proposed tools is referring to the practicality of chosen tools, effectiveness and appropriateness in solving the problems.

3.1.1 Prototyping model

The prototyping model has been chosen to be the best approach to describe the development of this project. This is due to the fact that prototyping helps the analyst effectively shortens the time between ascertainment of information requirement and delivery of a workable system. Additionally, using prototyping instead of the System Development Life Cycle might overcome some of the problems of accurately identifying user information requirement[4]. System prototypes allow users to experiment the requirements and analyze how the system supports their work. It is therefore a means of requirement validation. Users discover requirements errors or omission early in the software process.

A software prototype is not normally intended for design validation but to help and check the real requirements of the system. The benefits of developing prototype early in the software process are[5]: -

- Misunderstanding between software developers and users mat be identified as the system functions are demonstrated.
- Missing user services may be detected.
- Difficult-to-use or confusing user-services may be identified and refined.
- Software development staff may find incomplete and inconsistent requirements as the prototype is developed.
- The prototype serves as a basis for writing the specification for production of quality system.

A process model for prototype development is shown in **Figure 3.1**. It comprises the establishment of system objectives, identification of system functionality, prototype development and the evaluation of prototype.

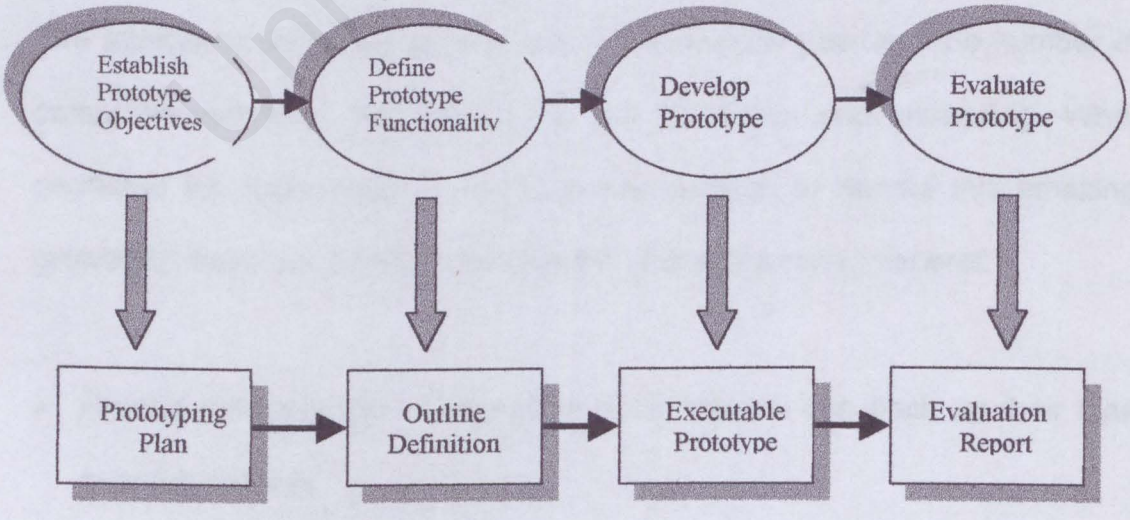


Figure 3.1 **The Process of Prototype Development**

In overall, by developing a prototype, requirements and design risks can be reduced.

3.2 Analysis on existing development tools

3.2.1 The Internet

The Internet is a global system of networked computers together with their users and data. It provides uses or makes accessible, either publicly or privately; high level services layered on the communications and related infrastructure. The concept of being able to access information quickly and easily led to the vision of the Internet[2].

Today, the Internet or the 'Information Superhighway' is in place, but for many people, the mysteries surrounding it involves where to go and how to travel. Like travelling a highway in a foreign country and being unable to read the road signs, navigating the Information Superhighway can be frustrating and time-consuming without the right knowledge and tools. However, it is estimated that each day, approximately 33000 new users go online.

The Internet is still growing at a rate of 100% each year and the number of computers linked to the Internet is now 16 million and increasing. What permitted the technology to be adaptable enough to handle this amazing growth[6]? Here are some of the benefits of the Internet in general: -

- *Provide convenience* - Computers on a network can back up their files over the network.
- *Allow sharing* - Networked computers can share resources, such as disks and printers.

- *Facilitate Communications* - Sending and receiving e-mail, transferring files and video conferencing are examples of how networks promote communications.
- *Generate savings* - Networked computers can provide more computing power for less money. Several small computers connected on a network can provide as much as more computing power than a single, large computer and will cost significantly less. Also, since resources can be shared, not everyone needs their own peripherals, which can result in a substantial cost saving.
- *Provide reliability* - If one part of a network is down, useful work may still be possible using a different network path.
- *Simplify scalability* - It is relatively easy to add more computers to an existing network.

Based on the unlimited advantages of the Internet technology, we can assume that the Internet will continue to grow, change and support new applications to meet the world's need.

3.2.2 Client/Server Computing

A decade ago, everyone was excited about a new technology that was going to revolutionize the way business is conducted in corporation. It would provide a new paradigm for information processing that would facilitate collaboration and information sharing vast number of system and organization. It has developed as the computer industry moved from a

centralized shared logic-based system to a network of workstations and servers[6].

This new technology was the client/server computing. The client/server computing involves splitting an application into tasks and putting each task on the platform where it can be handled most efficiently. The key notation of breaking up the problem is to provide designated layers and functionality that can be written and deployed across multiple machines in an optimized manner. This usually results in putting the processing for presentation to the user/client machine and the data management and storage on the server. Depending on the application and software used, all data processing may occur on the client or is split between the client and the server. The server is connected to the client via a network. The server software accepts data from the client and then return with results to the client. The client manipulates the data and presents the results to the user. In the usual client/server model, one server is activated and awaits client's requests. Typically multiple client programs share the services of a common server program. Both client programs and server programs are often part of a larger program or application.

3.2.3 Web Server

A web server is a computer software program running on a computer connected to he Internet that serves web pages upon request. The term ' web server ' is also used sometimes to refer to the computer on which the computer is running. A web browser is a software program that acts as an

interface between the users and the inner-workings of the Internet, specifically the WWW[1]. The browser not only sends messages to web servers to retrieve the requested page, but also renders the HTML code once it arrives. That is, the browser interprets the code and displays the results on the screen. Some examples of web servers are Microsoft Internet Information Server 4.0 for Windows NT, Netscape Enterprise Server and Microsoft Personal Web Server for Windows 98.

- **Microsoft Internet Information Server**

Microsoft Internet Information Server 4.0 is a comprehensive solution that will surely help Windows NT take a bite out of the Unix-dominated Web server pie. With perks for both small and large Web sites, IIS 4.0 comes with powerful extras, including Active Server Pages for building dynamic Web pages, Crystal Reports for custom reporting, Microsoft FrontPage 97 for site management, Index Server for advanced searching, and NetShow for on-demand multimedia.

IIS's tight integration with Windows NT is immediately apparent. IIS uses Windows NT's User Manager to maintain users and groups, saving you the trouble of maintaining multiple sets of network and Web site users. IIS also utilizes Windows NT's Event Viewer and Performance Monitor to view such items as bytes sent per second and current CGI requests.

IIS is also an extremely capable performer all around, one that would suit any Web site's needs. IIS performed very well serving static pages and handling

ISAPI processing on the server side. Depending on the client load, IIS held its own against or outperformed Netscape servers on any platform with static pages and when we added ISAPI to the mix. IIS began to outshine its competitors as we increased the load to 56 and then 60 clients with static pages, boding well for its scalability. IIS also managed the top performance on our latency tests.

IIS comes with three default services: WWW, FTP, and Gopher. Its Internet Service Manager (ISM) application controls these services on this or any other IIS server on the network. ISM is run from the Windows NT Server or from a Windows NT or Windows 98 workstation. For remote administration, we can run an HTML version of ISM from a browser. Mapping logical URLs to directories is straightforward, but IIS can't map to a directory on another server, a feature Enterprise handles easily.

IIS 3.0 proves that being a Webmaster no longer means we have to be a Unix expert or CGI programmer. Whether we are implementing a small intranet or a large Internet site on a Windows NT platform, this intuitive package could be the Web server for the developer.

	POWER	EASE
Documentation	Excellent	Good
Installation/configuration	Good	Excellent
Management/administration	Excellent	Excellent

Content and site management	Good	Excellent
Security	Good	Excellent
Web development	Excellent	Excellent

***Table 3.1* Suitability to task - Microsoft Internet Information Server**

- **Netscape Enterprise Server**

Building on Netscape FastTrack Server's [13]strong foundation, Netscape Communications Corp. scores with Netscape Enterprise Server. Enterprise adds site and content management tools and incorporates a robust Web development platform. Ideal for medium-size to large Web sites requiring sophisticated control over the server and site content, Enterprise performed in the top tier on all of our tests and, under Windows NT, even outdid some of its Unix brethren.

Enterprise is not only tested under Windows NT but also under Digital Unix, Irix, and Solaris. Under Windows NT, Enterprise held its own against the top performers, one of which was Enterprise under Digital Unix. Enterprise also excelled on the test measuring throughput with NSAPI in the mix. Against products supporting two processors, Enterprise under Digital Unix shone above the rest. Surprisingly, Enterprise running under Solaris performed the worst of the bunch on the same test.

After sailing through the effortless installation, we can tweak Enterprise in almost limitless ways--a legacy of its Unix roots--controlling everything from performance tuning to creation of default configuration styles for documents.

The management interface runs from any browser that supports frames and JavaScript, letting you manage the server remotely from any client or platform.

Enterprise provides various options for mapping and forwarding URLs and, unlike most of the other servers in this roundup, supports URL redirection to directories on other servers. For large Web sites, Enterprise supports hardware and software virtual servers. Hardware virtual servers must share the same server configuration but can have different IP addresses, and software virtual servers must share an IP address but can have different configurations. To host multiple virtual servers with different addresses and configurations, you must install a separate instance of Enterprise for each virtual server.

Supporting everything from CGI to JavaScript and NSAPI, Enterprise offers a powerful, open development platform. The feature-rich LiveWire module comes with Site Manager and Application Manager. Site Manager resembles Microsoft FrontPage 97, with tools for tracking all site elements and verifying internal and external hyperlinks. It also includes various Web-site templates for creating a complete site from scratch.

	POWER	EASE
Documentation	Excellent	Good
Installation/configuration	Excellent	Excellent
Management/administration	Excellent	Fair
Content and site management	Excellent	Excellent
Security	Good	Good

Web development	Excellent	Excellent

***Table 3.2 Suitability to task* - Netscape Enterprise Server**

3.2.4 Database Server

Database server is a computer and software application that uses the client/server technology to distribute the processing of data in the database between the server and client computers. Two key features of a server database become important because of the client access to data are providing a single point of access to the data in the database dividing processing and manipulation between the client and server systems. By using reliable database management system, the consistency and accuracy of data can be ensured. Among some of the popular database server in the market are Microsoft SQL Server, Microsoft Access and Oracle.

- **Microsoft SQL Server**

[1]Microsoft SQL Server version 7.0 is a defining release for Microsoft's database products, building on the solid foundation established by SQL Server 6.5. As the best database for Microsoft® Windows NT® Server, SQL Server is the relational database management system (RDBMS) of choice for a broad spectrum of corporate customers and independent software vendors (ISVs) that are building business applications. Customer needs and requirements have driven significant product innovations in ease of use, scalability and reliability, and data warehousing.

Important areas of leadership and innovation in Microsoft SQL Server 7.0 include:

- First database to scale from the laptop to the enterprise using the same code base, offering 100 percent code compatibility.
- First database to support auto-configuration and self-tuning.
- First database with an integrated online analytical processing (OLAP) server.
- First database with integrated Data Transformation Services.
- The Data Warehousing Framework is the first comprehensive approach to solving the metadata problem.
- First database to provide multiserver management for large numbers of servers.
- Wide array of replication options of any database.
- Tight integration with Windows NT Server, Microsoft® Office and the Microsoft® BackOffice® family.
- Universal Data Access, Microsoft's strategy for enabling high-performance access to a variety of information sources.

SQL Server 7.0 has been through 17 months of testing and more than 100,000 beta sites. Microsoft's commitment to this testing is demonstrated through the Early Adopter Program (EAP), ISV Migration Labs, and the 1K Database Challenge. The 1K Database Challenge resulted in more than 1,200 customer production databases being upgraded to SQL Server 7.0.

➢ **Microsoft Access**

Since its first introduction in 1992, Microsoft® Access has become a leader in the desktop database category among a wide variety of users. Access 1.0 debuted in the early 90s as the first desktop relational database management system (RDBMS) designed for the Microsoft Windows® operating system[1].

Experienced database users were impressed that such a powerful desktop database could be so easy to use. Access 2.0 continued to change the way end users understand and use databases. When Access was first included with the Microsoft Office suite, Office users began recognizing the strong need for a relational database for finding and managing data as an integral part of overall desktop productivity to make better business decisions.

The popularity continued in late 1995 with the introduction of Access 95, the world's first 32-bit RDBMS. Access 97, which was available in January 1997, combined the best of a database with the best of the Web by offering the capabilities to easily share static and dynamic data via the corporate intranet.

Today, the popularity of Access has soared to include not only experienced database users, but also first-time database users. With Access 2000, newer users will appreciate the strong integration with Office applications and the familiar look that makes it easy to get up and running quickly. Access power users and developers will find new and exciting ways to take advantage of Access' popularity among end users by increasing the scalability of Access

2000 with stronger integration to enterprise level databases. Whether users are creating a database to manage contacts and customers or creating a tracking system for inventory, Access provides an easy way for all levels of desktop users to find, manage and share data.

The remainder of this document outlines the new features in Access 2000 as well as the updated popular favorites for users who are considering a desktop database for the first time and power users who are interested in upgrading their existing Access databases to a true client-server solution.

Overview of New Features

Whether users are creating a stand-alone desktop database for personal use, departmental use or for an entire organization, Access offers an easy-to-use database for managing and sharing data. Access 2000 brings not only the traditional broad range of easy data management tools but also adds increased integration with the Web for easier sharing of data across a variety of platforms and user levels and additional ease-of-use enhancements to assist with personal productivity.

Of particular importance, Access 2000 can act as a front-end client to corporate-level, back-end databases, such as Microsoft SQL Server™. Access can now be used in two ways: as a standalone application for creating databases for individual or departmental use or as an easy-to-use interface client to a more scalable and robust back-end database that was

previously only available to professional database administrators (DBAs). This lowers the bar for creating true client/server applications by allowing end users to take advantage of the ease-of-use of Access combined with the scalability and reliability of Microsoft SQL Server.

Regardless of the back-end data source selected, end users will still have the same easy-to-use experience of the most popular desktop database client.

3.2.5 Active Platform

The Microsoft Active Platform is an open, standards-based software architecture for delivering rich content and line-of-business applications over the Internet and intranets. It combines the power of PC and network computing to link people with information, anywhere, any time.

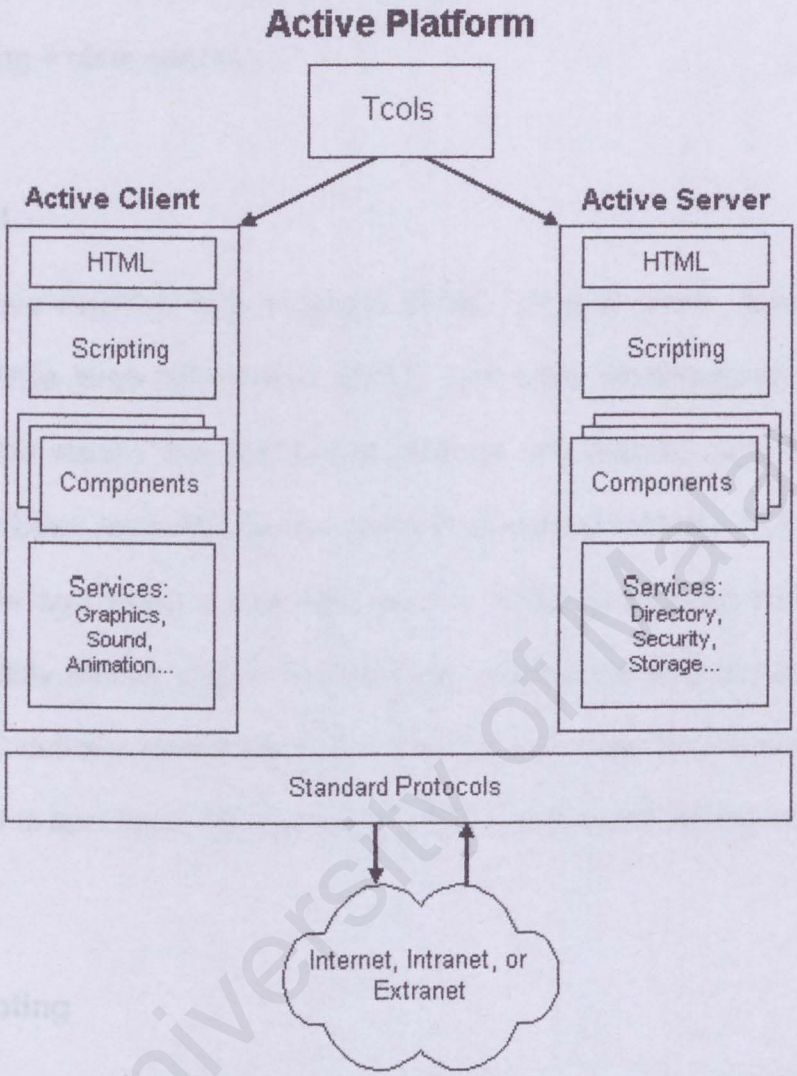


Figure 3.2 **The structure of the Active Platform**

This picture shows various tools, services, and technologies: HTML, scripting (JScript™, Visual Basic® Scripting Edition [VBScript], or other scripting languages), and components (Java™ or ActiveX). When we combine these technologies, we can put the result on the client machine and have an Active Client, or we can put the result on the server machine and have an Active Server. Active Platform is an umbrella term that encompasses all of these

Internet- and intranet-related technologies. It is based on the formula: HTML + scripting + components.

➢ **HTML**

The Active Platform fully supports HTML 3.2 and other standards, as the World Wide Web Consortium (W3C) and other standards bodies approve them. This means that the Active Platform will support cutting-edge HTML that has been accepted by the standards-making masses. We won't be left out in the cold when a new extension to HTML supporting some whiz-bang functionality comes along. For example, a proposal that is currently before the W3C defines the standards for creating site maps on the Web. When this proposal is approved, we can be sure that the Active Platform will support it.

➢ **Scripting**

HTML is a great language as far as mark-up languages go, but let's face it: The Active Platform fully supports most scripting languages, including VBScript and JScript.[1] The example below shows an HTML page that has an embedded spinning world applet and a spin button control. The example uses scripting to activate the controls.

➢ **Components**

Components are small, well-defined pieces of the puzzle that perform a specific task. Components can be plugged into existing solutions to provide a function, such as log-on authentication. What's nice about the Active Platform is that developers can use their own tools and programming languages to create these components. The developer isn't boxed into a specific language that she may not already know.

The person who bought the component wouldn't necessarily care which language it was built in, because both Java and C components work under the Active Platform. Using the tools available within the Active Platform, we can build HTML pages; ActiveX controls for the client or server using Visual Basic, C++, or Java; scripts for wer client or server using JScript or VBScript; and even Java applets. The developer isn't limited by operating system either. The Active Client is Microsoft's cross-platform "thin" client. All of the features supported by the Active Client, including HTML, Microsoft's Java implementation, language-independent scripting, and ActiveX objects on the Internet are supported on the Macintosh, Windows® 3.1, Windows 95, Windows NT, and UNIX.

3.2.6 Web Programming Technology

➢ **ASP**

Active Server Pages is an open, compile-free application environment in which you can combine HTML, scripts, and reusable ActiveX server components to create dynamic and powerful Web-based business solutions. Active Server Pages enables server side scripting for IIS with native support for both VBScript and Jscript.

Files created with Active Server Pages have the extension .ASP. With ASP files, we can activate your Web site using any combination of HTML, scripting--such as JavaScript or Visual Basic® Scripting Edition (VBScript)--and components written in any language.

This means our ASP file is simply a file that can contain any combination of HTML, scripting, and calls to components. When we make a change on the ASP file on the server, we need only save the changes to the file—the next time the Web page is loaded, the script will automatically be compiled. How does this happen? It works because ASP technology is built directly into Microsoft Web servers, and is thus supported on all Microsoft Web servers: Windows NT Internet Information Server (IIS) 3.0, Windows NT Workstation, and Windows 95 Personal Web Server.

ASP includes five standard objects for global use:

- **Request**—to get information from the user
- **Response**—to send information to the user
- **Server**—to control the Internet Information Server
- **Session**—to store information about and change settings for the user's current Web-server session
- **Application**—to share application-level information and control settings for the lifetime of the application

➢ **Common Gateway Interfaces (CGI)**

The Common Gateway Interface, or CGI, is an interface for running external programs, or gateways, under an information server. Currently, the supported information servers are HTTP servers.

What we refer to as gateways are really programs which handle information requests and return the appropriate document or generate a document on the fly. [15]With CGI, our server can serve information which is not in a form readable by the client (such as an SQL database), and act as a gateway between the two to produce something which clients can use.

Gateways can be used for a variety of purposes, the most common being the handling of ISINDEX and FORM requests for HTTP.

Some examples of the uses of CGI:

- Converting the system's manual pages into HTML on the fly and sending the HTML result to the client.
- Interfacing with WAIS and archive databases, converting the results to HTML and sending the result to the client.
- Allowing user feedback about your server through an HTML form and an accompanying CGI decoder.

3.2.7 Scripting technology

Scripting languages are designed for different tasks than system programming languages. Scripting programming languages are designed for gluing: they assume the existence of a set of powerful components and are intended primarily for connecting components together . Some of the common scripting languages are Jscript, VBScript and JavaScript .

➢ **JScript**

JScript is the Microsoft implementation of the ECMA 262 language specification (ECMAScript Edition 3). With only a few minor exceptions (to maintain backwards compatibility), JScript is a full implementation of the ECMA standard. This overview is intended to help you get started with JScript.

JScript is an interpreted, object-based scripting language. Although it has fewer capabilities than full-fledged object-oriented languages like C++, JScript is more than sufficiently powerful for its intended purposes. JScript is

not a cut-down version of another language (it is only distantly and indirectly related to Java, for example), nor is it a simplification of anything. It is, however, limited. We cannot write stand-alone applications in it, for example, and it has no built-in support for reading or writing files. Moreover, JScript scripts can run only in the presence of an interpreter or "host", such as Active Server Pages (ASP), Internet Explorer, or Windows Script Host.

JScript is a loosely typed language. Loosely typed means you do not have to declare the data types of variables explicitly. In fact, JScript takes it one step further. You cannot explicitly declare data types in JScript. Moreover, in many cases JScript performs conversions automatically when needed. For instance, if you add a number to an item consisting of text (a string), the number is converted to text.

- **VBScript**

VBScript is a subset of Visual Basic for Applications. Therefore, VBScript programming has many similarities to Visual Basic for Applications programming. Many of the powerful features of Visual Basic for Applications, such as classes and API calls, were omitted to make the language portable and secure.

Although VBScript is just text and can be written with a simple text editor, a graphical design tool for VBScript is available. This visual layout tool is called *ActiveX Control Pad*. ActiveX Control Pad allows us to combine HTML code,

ActiveX controls, HTML layouts, and VBScript or JavaScript. ActiveX Control Pad works in conjunction with the HTML Layout control.

VBScript, with the support of the Internet Explorer, can automate ActiveX components, vendors can design ActiveX controls to perform particular Internet tasks. A stock ticker control is a good example of such a control. Admittedly, we already have a rich assortment of ActiveX controls in the form of OCX controls, but these controls are typically not optimized for downloading across the Internet.

Compatibility with existing browsers is another issue for VBScript. Although the Internet Explorer supports both VBScript and JavaScript, VBScript is not currently supported by the Netscape browser. In the future, we may see support from Netscape and others, but for now, interactive web sites that use VBScript are limited to platforms running the Internet Explorer.

In a bid to create standard scripting support that would broaden the appeal of VBScript while maintaining current support for other engines, such as JavaScript, Microsoft is working with the World Wide Web Consortium to develop a standard for ActiveX Scripting and the event-driven model. Such efforts will improve the viability of VBScript, but even without an absolute standard, the Internet Explorer promises to have a large market share because of tight integration with future releases of Windows. Ultimately, VBScript may take center stage in Windows development as the browser becomes the primary desktop interface. Work is ongoing at Microsoft to

completely unify the desktop environment inside the browser, creating a single, comprehensive view of local files, network files, and Internet files. This new view is known as *page view*.

Implementing page view will radically alter the Windows desktop environment. First and foremost, the concept of a separate browser running on a desktop is eliminated. In fact, the browser will *be* the desktop. Imagine an environment in which the Windows Explorer is replaced by a browser interface. We will view all of the files on your local machine just as if they are web pages. Ultimately, the user will work with all data the same way, regardless of the location of the data. For example, local, network, and Internet files will be seamlessly integrated into the browser interface. This represents a significant advance in the user interface because users will no longer have to worry about data location and the technical knowledge necessary to connect to the data.

- **JavaScript**

Perhaps the best-known scripting language prior to the introduction of VBScript was JavaScript. JavaScript is used to create interactive web applications supported by the Netscape browser. JavaScript offers many of the same advantages as VBScript. JavaScript is simple to use, lightweight, and dynamic. Developers can easily embed code functionality for interactive applications inside a web page.

The most noticeable difference between JavaScript and VBScript is the syntax. The syntax for JavaScript is similar to the syntax for the C++ programming language. Since VBScript is a subset of Visual Basic for Applications, VBScript follows the Visual Basic for Applications syntax.

The Internet Explorer 3.0 supports JavaScript directly through a scripting engine in the file jscript.dll. In fact, we can use both VBScript and JavaScript in a single web page. HTML form elements, interact with the browser, and automate any ActiveX component.

3.2.8 Application platform

- **Microsoft Windows NT Server**

Microsoft Windows NT Server is a 32-bit, high performance, network operating system that is designed to be easy to use, robust, and extensible. It includes Internet (and intranet) functionality and communications services for today's business computing environments, while supporting interoperability with multiple platforms.

The wide variety of services supported by Microsoft Windows NT Server provides a foundation for distributed applications by supporting the development and implementation of these applications. Many of these Windows NT services are tied together with the Component Object Model

(COM). COM is Microsoft's component-based communication standard that allows us to build flexible, extensible, dynamic distributed applications.

Benefits

Windows NT Server 4.0 was designed to help developers build and deploy business applications faster than ever before. The Option Pack integrates new Web, transaction, scripting, component, and message queuing services directly into Windows NT Server 4.0. New management tools in Windows NT Server 4.0 and the Option Pack help us set up Web sites, manage content, and analyze usage patterns to improve the site as it evolves.

Multiple Web sites on a single machine, innovative Web publishing features, customizable tools, and new wizard technologies make Windows NT Server 4.0 the best platform to publish and share information securely over corporate intranets and the Internet.

- **Microsoft Windows 98**

The Microsoft Windows 98 operating system is the upgrade to Windows that makes the computer works better and play better. It works better by making it simple to access the Internet and by providing better system performance along with easier system diagnostics and maintenance. With Windows 98, our system plays better as well with support for the latest graphics, sound, and multimedia technologies, the ability to easily add and remove peripheral devices with support for Universal Serial Bus (USB), and it also enables to

watch TV on your PC. Windows 98 Second Edition is an update to Windows 98 that enhances the leading consumer operating system with the latest Internet, home-networking and hardware technologies.

Benefits

- **Improved Ease of Use & Internet Access**--Dynamic Web-based help and 15 Wizards help make the PC easier to use. Windows 98's Web-aware user interface lets you find information more easily with the same view of content on your PC, network, or the Web. Windows 98 Second Edition now provides Internet Connection Sharing, allowing users to share a single Internet that make Windows 98 a more robust and reliable operating connection over multiple networked PC's.
- **Improved Performance & Reliability**--Reduce the time it takes to launch applications, get help cleaning your hard disk and improve its efficiency. this is all possible with improvements system.
- **Enables a New Generation of Hardware & Entertainment**--Take advantage of the latest hardware advances, like the USB, DVD, and IEEE 1394, and expand the use of your PC with multiple monitor and digital imaging support and Microsoft WebTV for Windows.

➢ **UNIX**

The first version of UNIX was created in 1969 by Kenneth Thompson and Dennis Ritchie, system engineers at AT&T's Bell Labs.[11] It went through

many revisions and gained in popularity until 1977, when it was first made commercially available by Interactive Systems Corporation.

At the same time a team from the University of California at Berkeley was working to improve UNIX. In 1977 it released the first Berkeley Software Distribution, which became known as BSD.

Meanwhile the AT&T version was developing in different ways. The 1978 release of Version 7 included the Bourne Shell for the first time. By 1983 commercial interest was growing and Sun Microsystems produced a UNIX workstation. System V appeared, directly descended from the original AT&T UNIX and the prototype of the more widely used variant today.

Linux is an operating system that was initially created as a hobby by a young student, Linus Torvalds, at the University of Helsinki in Finland. Linus had an interest in Minix, a small UNIX system, and decided to develop a system that exceeded the Minix standards. He began his work in 1991 when he released version 0.02 and worked steadily until 1994 when version 1.0 of the Linux Kernel was released. The current full-featured version is 2.4 (released January 2001) and development continues.

- **Linux**

Linux is developed under the GNU General Public License and its source code is freely available to everyone. This however, doesn't mean that Linux and its assorted distributions are free -- companies and developers may

charge money for it as long as the source code remains available. Linux may be used for a wide variety of purposes including networking, software development, and as an end-user platform. Linux is often considered an excellent, low-cost alternative to other more expensive operating systems.

Due to the very nature of Linux's functionality and availability, it has become quite popular worldwide and a vast number of software programmers have taken Linux's source code and adapted it to meet their individual needs. At this time, there are dozens of ongoing projects for porting Linux to various hardware configurations and purposes.

Here are 10 reasons why Linux could be the best operating system :-

- A Linux Distribution has thousands of dollars worth of software for no cost (or a couple of dollars if purchased on CD)
- Linux is a complete operating system that is:

  stable - the crash of an application is much less likely to bring down the operating system under Linux

  reliable - Linux servers are often up for hundreds of days compared with the regular reboots required with a Windows system

  extremely powerful
- Comes with a complete development environment, including C, C++, Fortran compilers, toolkits such as Qt and scripting languages such as

Perl, Awk and sed. A C compiler for Windows alone would set you back hundreds of dollars.

- Excellent networking facilities: allowing you to share CPUs, share modems etc; all of which are not included or available with Windows 95.
- The ideal environment to run servers such as a web server (e.g. Apache), or an FTP server.
- A wide variety of commercial software is available if your needs aren't satisifed by the free software.
- An operating system that is easily upgradeable. After any length of time a typical installation of Windows and software gets into a complete mess. Often the only way to clear out all the debris is to reformat the hard disk and start again. Linux, however, is much better for maintaining the system.
- Supports multiple processors as standard.
- True multi-tasking; the ability to run more than one program at the same time.
- An excellent window system called X; the equivalent of Windows but much more flexible.

3.3 Consideration on Development Technologies

After reviewing and considering the requirement needed for the system, possible development tools are analyzed. Listed below are the chosen tools to develop the proposed system

➢ **Microsoft Visual Basic**

Microsoft Visual Basic is chosen due to its ease of use and the acceptable learning curve.Furthermore, Visual Basic provides us with a complete set of tools to simplify rapid application development.[3]

- Data access features allows to create databases, front-end applications, and scalable server-side components for most popular database formats, including Microsoft SQL Server and other enterprise-level databases.
- ActiveX™ technologies allows to use the functionality provided by other applications, such as Microsoft Word word processor, Microsoft Excel spreadsheet, and other Windows applications.
- Internet capabilities make it easy to provide access to documents and applications across the Internet or intranet from within your application, or to create Internet server applications.

➢ **Microsoft Visual InterDev**

Microsoft Visual InterDev 6.0 is the latest version of the leading tool for developers building dynamic Web applications. Therefore, it is chosen as web development tool. Support for Active Server Pages, middle-tier components written in any language, Dynamic HTML, and integrated

database design and programming tools make Visual InterDev the ideal tool for building dynamic, data-driven Web sites.

[1]Visual InterDev 6.0 enables developers to build applications accessible from any platform running a standard Web browser such as Microsoft Internet Explorer or Netscape Navigator. The Visual InterDev development environment itself runs on Microsoft Windows 95 or Microsoft Windows NT 4.0 or later.

- **VBScript**

VBScript is chosen because of the similarity of VBScript and Visual Basic. It is actually a subset of Visual Basic for Applications. Therefore, VBScript programming has many similarities to Visual Basic for Applications programming. Many of the powerful features of Visual Basic for Applications, such as classes and API calls, were omitted to make the language portable and secure.

- **Microsoft Access**

As for database repository, MS Access has been chosen. This is because of its easiness to find and use, web-enabled features for sharing information and rich analysis tools for managing information.

- **Microsoft Windows 98**

The Microsoft Windows 98 has been chosen as the operating system to develop the proposed system due to its improved ease of use and internet access, reliability and flexibility.

3.4 Functional Requirements.

These are the statements of services that the system should provide, hoe the system should react, to particular inputs and how the system should behave in particular situation. Listed below are the functional requirements involved in the proposed system: -

- **User Authentication and Authorization**

For administrative module, users authentication and authorization are very important in order to provide access control against the system. Access controls restrict use of computer system resources to authorized users, limit the actions authorized users can take with these resources and ensure that users obtain only authentic computer system resources[12].

- **New License Application**

The proposed system will be able to add new licensee details in the database. The system will generate file numbers for approved licenses associated with it.

- **Licensee Details Retrieval and Updating**

The proposed system is expected to have the capabilities to retrieve and update the licensee details when the renewal, modification and cancellation are performed.

- **Provide Query Capabilities To Search for MOH Branches and Licensed Premises in Malaysia**

The system will enable the users to search for the nearest MOH branches and licensed premises in Malaysia by year.

- **Error Handling**

The proposed system shall be able to detect and protect the licensing process against incomplete or erroneous data entry into the database. Error messages will be displayed for the users.

- **General Information**

For the guest sub-system, read-only modules such as rules and regulations in license application, statistics of approved, rejected and cancelled licenses and lots of other things will be provided.

3.5 Non-functional Requirement

A non-functional requirement or constraint describes a restriction on the system that limits the choice for constructing a solution to the problem. These solutions will narrow down the selection of programming language, platform

or implementation techniques or tools. Among the non-functional requirements for the proposed system are:

- **Graphical User Interface(GUI)**

The proposed system will utilize the usage of graphical user interfaces. GUI allows direct manipulation of the graphical manipulation of the graphical representation on the screen.

- **User-friendly Interface**

Associated to the previous requirement, this function also allows users to operate the system with ease. This can be accomplished by using standard and appropriate color, font size, text positioning and graphics across all web pages.[6] The usage of intuitive and meaningful menus and icons will also be taken into consideration.

- **Security and Reliability**

This requirement ensures that only authorized users can access the administrator module and certain parts of users module. Data integrity is maintained by asking users to enter valid passwords before entering the certain module. The system is also expected to be reliable and perform its functions at any time.

- **Flexibility**

The proposed system will utilize the usage of new technologies and resources.

3.6 Requirement Specification for Hardware and Software

3.6.1 Server Hardware Requirement

- A server with not less than Pentium 233 MHz processor.
- At least 64 MB memory (recommended for performance wise).
- A hard disk for at least 4 GB of storage.
- Network Interface Card (NIC) and network connection with recommended bandwidth at 15 Mbps or more.
- Other standard computer peripherals.

3.6.2 Server Software Requirement

It is necessary to have various supporting software installed in the server computer in order to host and manual the system.

SOFTWARE	DESCRIPTION
Windows NT Server 4.0	Network Operating System
Internet Information Server 4.0	Web server service
Active Server Pages (ASP)	Server scripting engine
Microsoft SQL Server 7.0	Database repository
Microsoft Internet Explorer 5.0	Precondition for ASP installation

Table 3.3 Server Software Requirement

3.6.3 Client Hardware Requirement

The client hardware requirement are quite minimal as long as it has a reasonable amount of RAM and a moderate quality dial-up connection. Line. The recommended configurations are : -

- At least a Pentium 166 MHz processor
- At least 32 MB of RAM
- Network connection through existing network configuration or modem. (recommended at least 33.6 Kbps)
- Other standard computer peripherals

3.6.4 Client Software Requirement

- Microsoft Windows family operating system
- Microsoft Internet Explorer and above.

System Design

4. System Design

System design is the phase in which requirements analyzed and produced in the system analysis phase are translated and converted into a representation characteristics of the proposed system. The design process involves developing several models of the system at different level of abstraction. As a design is composed, errors and omissions in earlier stages are discovered. Generally, this phase will be focused on architectural design, abstract and functional design, interface design, data structure and database design[4].

4.1 Architectural Design

Large systems can be decomposed into sub-systems that provide some related set of services. The initial design process of identifying these sub-systems and establishing a framework for sub-system control and communication is called architectural design. It usually comes before detailed system specification.[5]

The first phase of the architectural design is usually concerned with decomposing a system into a set of interacting sub-system. The proposed Online Licensing System is structured into a number of principal sub-systems where a subsystem is an independent software unit. At its most abstract level, an architectural design is depicted as block diagram to represent an overview of the system structure and to describe he interaction between the sub-systems.

The Online Licensing System(OLS) is divided into two main sub-systems; administrative sub-system and customer sub-system. Here are the diagrams showing the OLS's sub-systems and its features: -

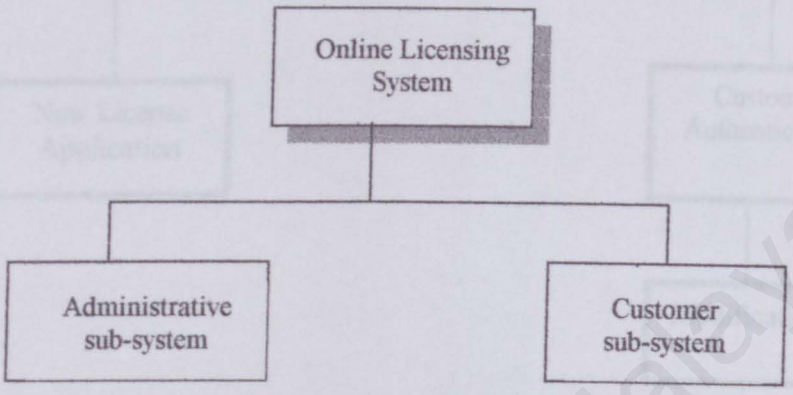


Figure 4.1 **Structure of the Online Licensing System**

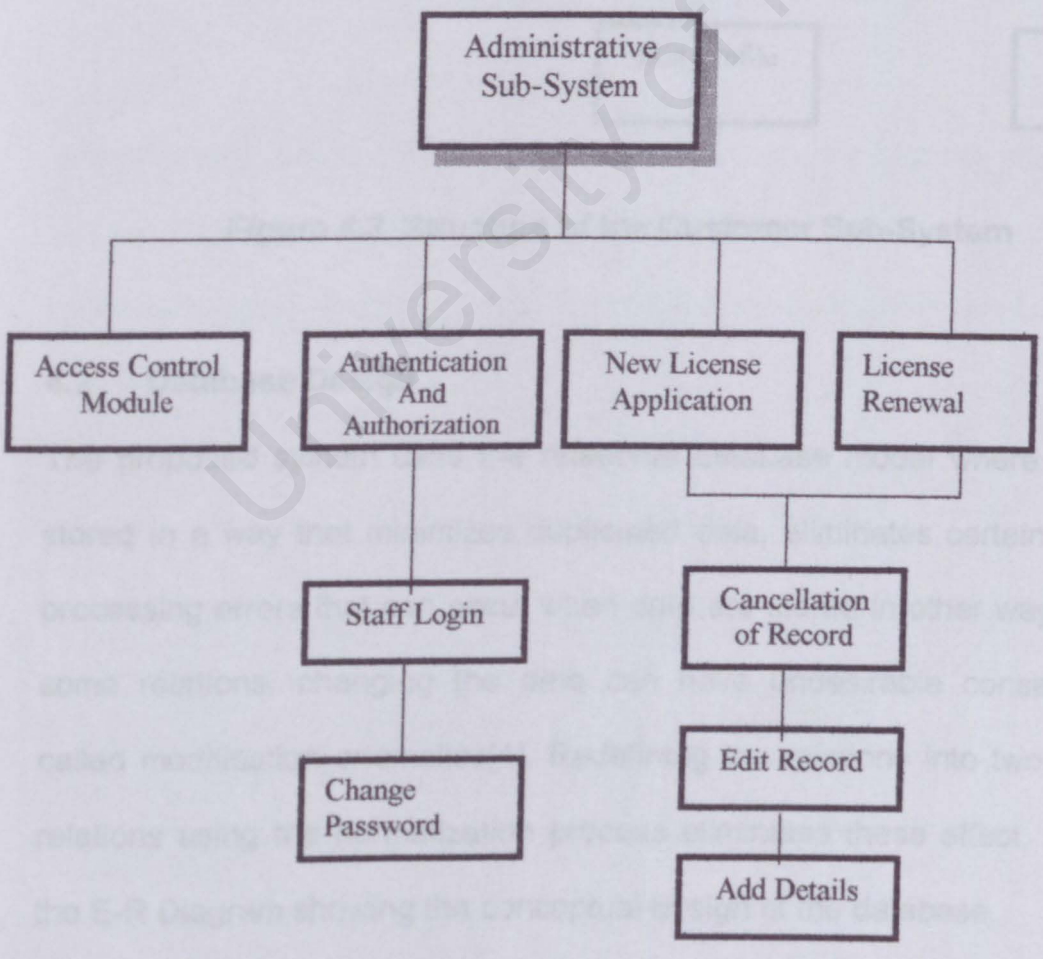


Figure 4.2 **Structure of the Administrative Sub-System**

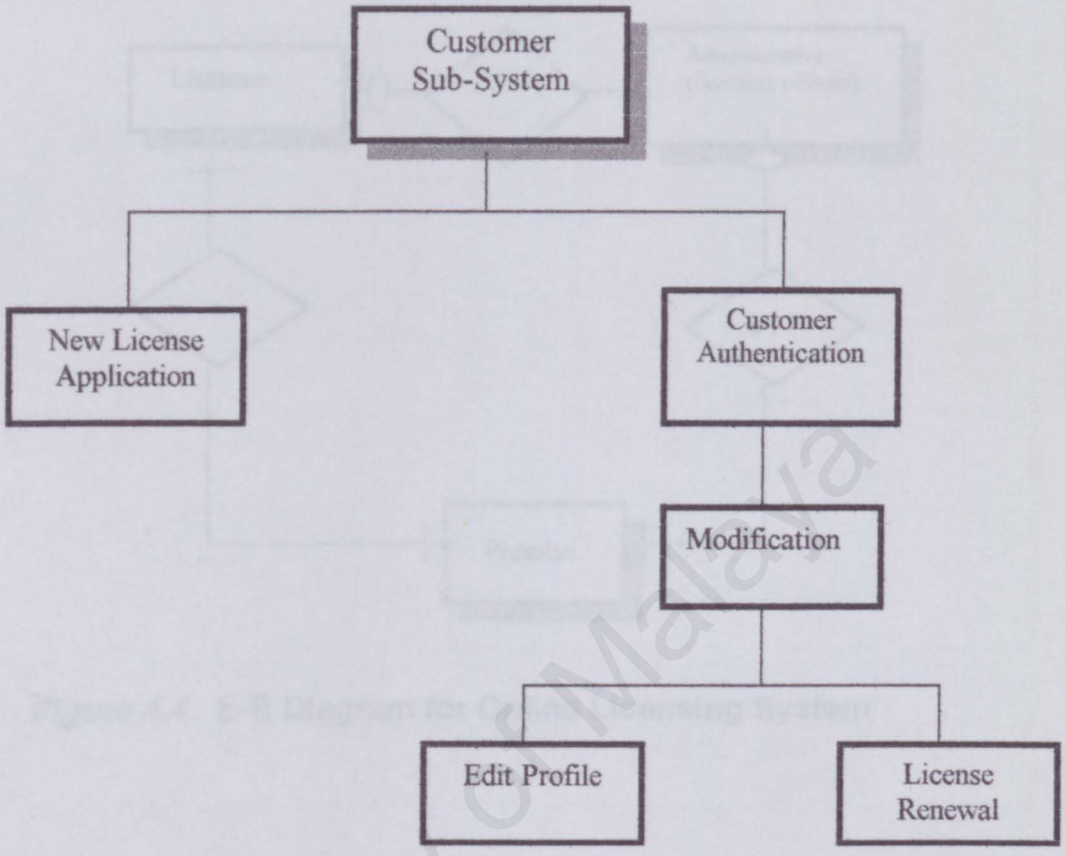


Figure 4.3 **Structure of the Customer Sub-System**

4.2 Database Design

The proposed system uses the relational database model where data are stored in a way that minimizes duplicated data, eliminates certain types of processing errors that can occur when data are stored in other ways. As for some relations, changing the data can have undesirable consequences called modification anomalies[4]. Redefining the relations into two or more relations using the normalization process eliminates these effect. Below is the E-R Diagram showing the conceptual design of the database.

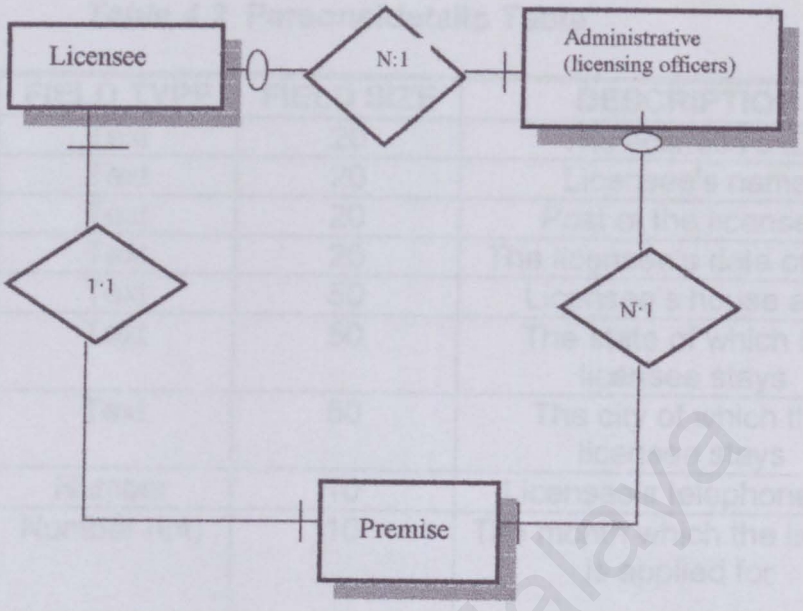


Figure 4.4 **E-R Diagram for Online Licensing System**

The following section will provide the database structure for the proposed system. Data dictionary may cover the whole organization, a part of the organization or a database. Data dictionaries for tables in Online Licensing System are as follows:-

Table 4.1 **Administrative Table**

FIELD NAME	FIELD TYPE	FIELD SIZE	DESCRIPTION
UserId	Autonumber	8	Admin identity
UserName	Text	10	Admin name
Password	Text	10	Password
UserGroup	Text	10	The user category
UserMail	Text	20	Admin's e-mail address

***Table 4.2* Personaldetails Table**

FIELD NAME	FIELD TYPE	FIELD SIZE	DESCRIPTION
User_Id	Text	20	The licensee's ID
appname	Text	20	Licensee's name
post	Text	20	Post of the licensee
Dob	Text	20	The licensee's date of birth
addH	Text	50	Licensee's house add
State	Text	50	The state of which the licensee stays
City	Text	50	The city of which the licensee stays
Tel	Number	10	Licensee's telephone no
App_mth	Number (int)	10	The month which the license is applied for
App_yr	Number (int)	4	The year which the license is applied for
Email	Text	50	Email address of the licensee

***Table 4.3* Premise Table**

FIELD NAME	FIELD TYPE	FIELD SIZE	DESCRIPTION
User_Id	Autonumber	2	The licensee's ID
File_No	Text	10	The licensee's file no
Premis	Text	50	The name of the premis
Jalan	Text	60	The premise add
Negeri	Text	50	The state of which the premise is located
Bandar	Text	50	The city of which the premise is located
Postcode	Number	10	The postcode of the premise
Tel	Number	10	The Premise telephone no
Fax	Text	10	Fax no of the premise
Coregis	Text	20	Company registration no.

***Table 4.4* Login_licensee Table**

FIELD NAME	FIELD TYPE	FIELD SIZE	DESCRIPTION
User_Id	AutoNumber	2	Licensee's ID
File_No	Text	10	The license File No
Coregis	Text	20	Company registration no.
premis	Text	50	Premise name

***Table 4.5* Feedback Table**

FIELD NAME	FIELD TYPE	FIELD SIZE	DESCRIPTION
F_Id	AutoNumber	2	Code of the district
F_Name	Text	50	Feedback sender's name
F_Feedback	Memo	60	The content of the feedback
F_Date	Date/Time	20	The date of feedback receival

Table 4.6 Search Table

FIELD NAME	FIELD TYPE	FIELD SIZE	DESCRIPTION
ID	AutoNumber	3	Search ID
State	Text	20	The name of each state in Malaysia
Add	Text	50	The address of MOH's branch in each state
Postcode	Number	10	The Postcode of the MOH's address
Tel	Number	10	MOH's telephone number
Fax	Number	10	MOH's fax number

Table 4.7 Archive Table

FIELD NAME	FIELD TYPE	FIELD SIZE	DESCRIPTION
ID	AutoNumber	3	Archive ID
tahun	Number	10	The year of license issuance
A	Number	10	The number of license A issued in that respective year
B	Number	10	The number of license B issued in that respective year
D	Number	10	The number of license D issued in that respective year
E	Number	10	The number of license E issued in that respective year
Sodium Hydroxide	Number	10	The number of Sodium Hydroxide Permit issued in that respective year

Table 4.8 Renewal Table

FIELD NAME	FIELD TYPE	FIELD SIZE	DESCRIPTION
UserId	Autonumber	2	The licensee's ID
File_No	Text	10	The licensee's file no
Premis	Text	50	The name of the premise
App_month	Text	10	The month of which the license will expire
App_year	Number	10	The year of which the license will expire
Coregis	Text	20	Company registration no.

Table 4.9 lesenAD Table

FIELD NAME	FIELD TYPE	FIELD SIZE	DESCRIPTION
license_Id	Autonumber	2	The licensee's ID
File_No	Text	10	The licensee's file no
Premis	Text	50	The name of the premis
Jalan	Text	60	The premise add
Negeri	Text	50	The state of which the premise is located
Bandar	Text	50	The city of which the premise is located
Postcode	Number	10	The postcode of the premise
Tel	Number	10	The Premise telephone no
Fax	Text	10	Fax no of the premise
Coregis	Text	20	Company registration no.
User_Id	Text	20	The licensee's ID
appname	Text	20	Licensee's name
post	Text	20	Post of the licensee
Dob	Text	20	The licensee's date of birth
addH	Text	50	Licensee's house add
State	Text	50	The state of which the licensee stays
City	Text	50	The city of which the licensee stays
Tel	Number	10	Licensee's telephone no
App_mth	Number (int)	10	The month which the license is applied for
App_yr	Number (int)	4	The year which the license is applied for
Email	Text	50	Email address of the licensee

Table 4.10 lesenBE Table

FIELD NAME	FIELD TYPE	FIELD SIZE	DESCRIPTION
license_Id	Autonumber	2	The licensee's ID
File_No	Text	10	The licensee's file no
Premis	Text	50	The name of the premis
Jalan	Text	60	The premise add
Negeri	Text	50	The state of which the premise is located
Bandar	Text	50	The city of which the premise is located
Postcode	Number	10	The postcode of the premise
Tel	Number	10	The Premise telephone no
Fax	Text	10	Fax no of the premise
Coregis	Text	20	Company registration no.
User_Id	Text	20	The licensee's ID
appname	Text	20	Licensee's name
post	Text	20	Post of the licensee
Dob	Text	20	The licensee's date of birth
addH	Text	50	Licensee's house add
State	Text	50	The state of which the licensee stays
City	Text	50	The city of which the licensee stays
Tel	Number	10	Licensee's telephone no
App_mth	Number (int)	10	The month which the license is applied for
App_yr	Number (int)	4	The year which the license is applied for
Email	Text	50	Email address of the licensee
Poison	Text	50	List of poison to apply for

Table 4.11 permitNaOH Table

FIELD NAME	FIELD TYPE	FIELD SIZE	DESCRIPTION
license_Id	Autonumber	2	The licensee's ID
File_No	Text	10	The licensee's file no
Premis	Text	50	The name of the premis
Jalan	Text	60	The premise add
Negeri	Text	50	The state of which the premise is located
Bandar	Text	50	The city of which the premise is located
Postcode	Number	10	The postcode of the premise
Tel	Number	10	The Premise telephone no
Fax	Text	10	Fax no of the premise
Coregis	Text	20	Company registration no.
User_Id	Text	20	The licensee's ID
appname	Text	20	Licensee's name
post	Text	20	Post of the licensee
Dob	Text	20	The licensee's date of birth
addH	Text	50	Licensee's house add
State	Text	50	The state of which the licensee stays
City	Text	50	The city of which the licensee stays
Tel	Number	10	Licensee's telephone no
App_mth	Number (int)	10	The month which the license is applied for
App_yr	Number (int)	4	The year which the license is applied for
Email	Text	50	Email address of the licensee
NAOH	Number	50	The quantity of Sodium Hydroxide to be applied for

4.3 Functional Design

Functional design of the proposed system will be depicted graphically using the data flow diagram. Data flow diagrams are diagrams which show the flow of data from one place to another. DFDs describe the processes of a system, showing how these processes link together through data stores and how the processes related to the users - the outside world. They are used to record the systems analysis as a part of the design documentation.

At their lowest level of detail, , DFDs are often included in a programmers working specification when the systems analysis is complete an the system is being programmed.

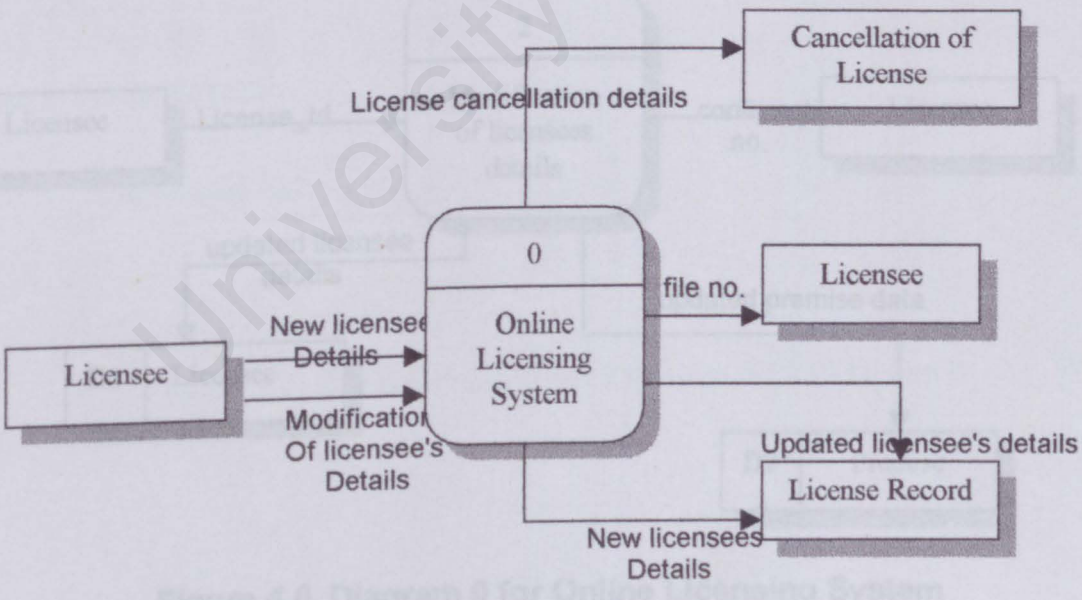


Figure 4.5 **Context Level Diagram for Online Licensing System**

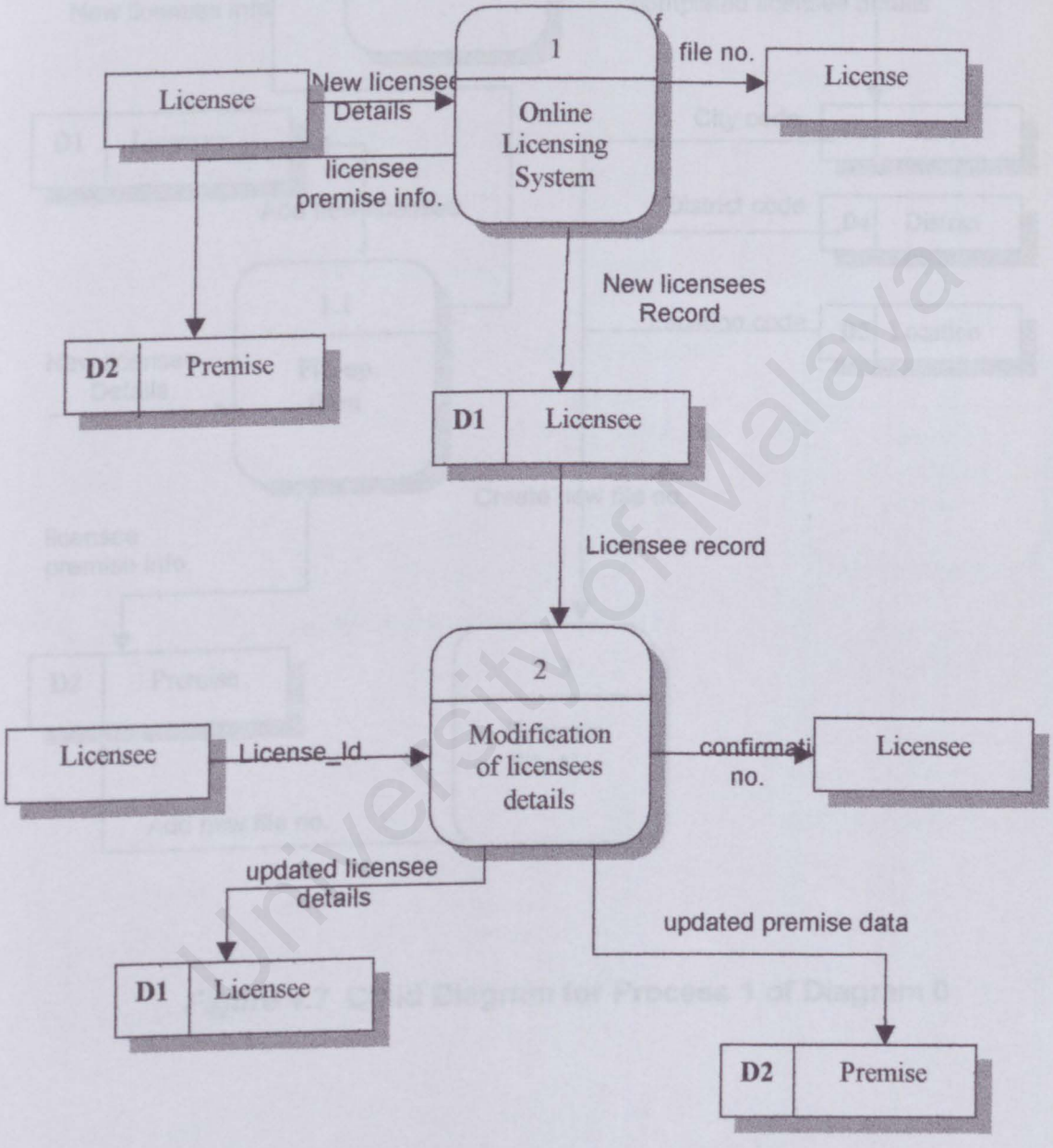


***Figure 4.6* Diagram 0 for Online Licensing System**

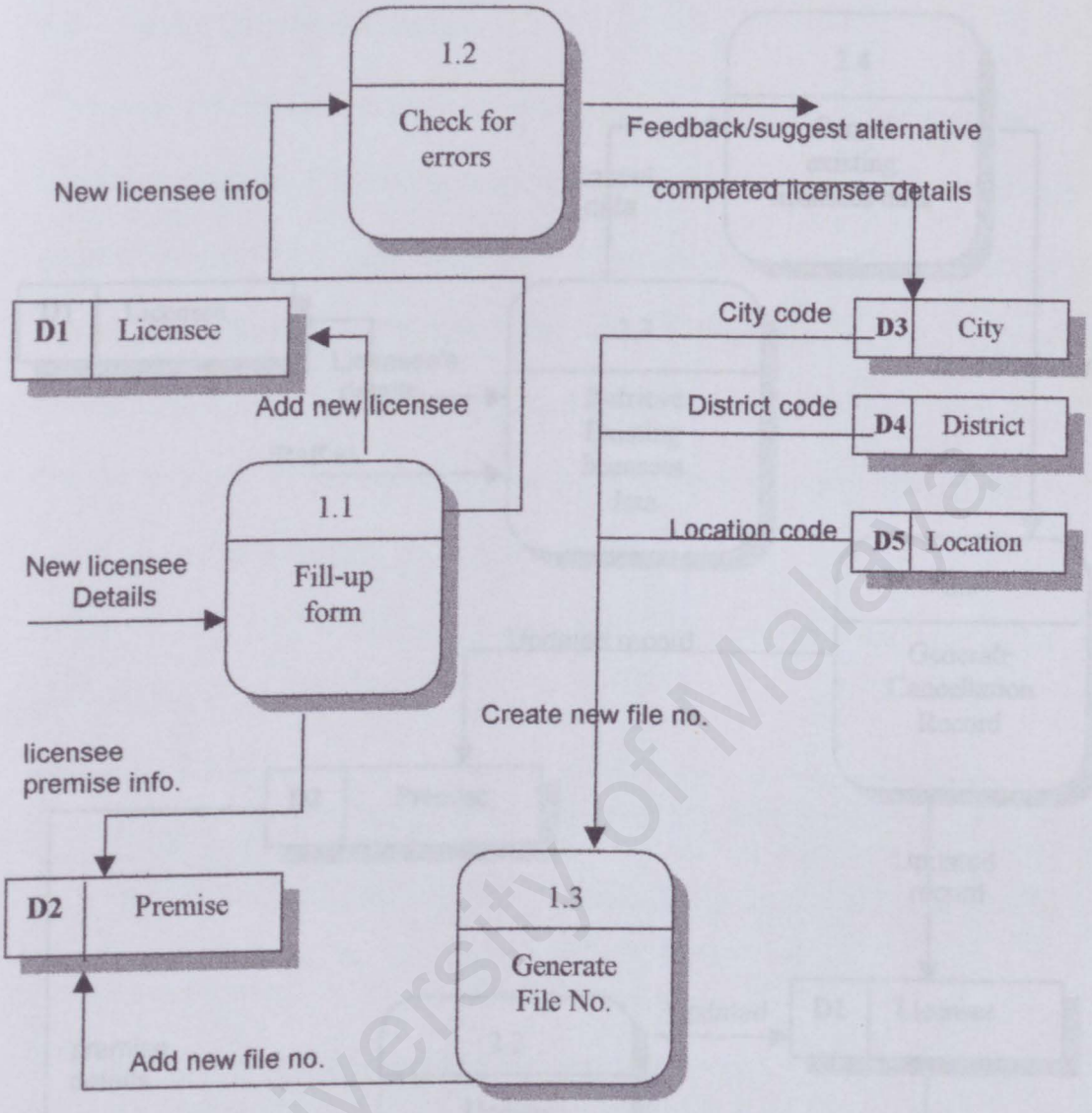


***Figure 4.7* Child Diagram for Process 1 of Diagram 0**

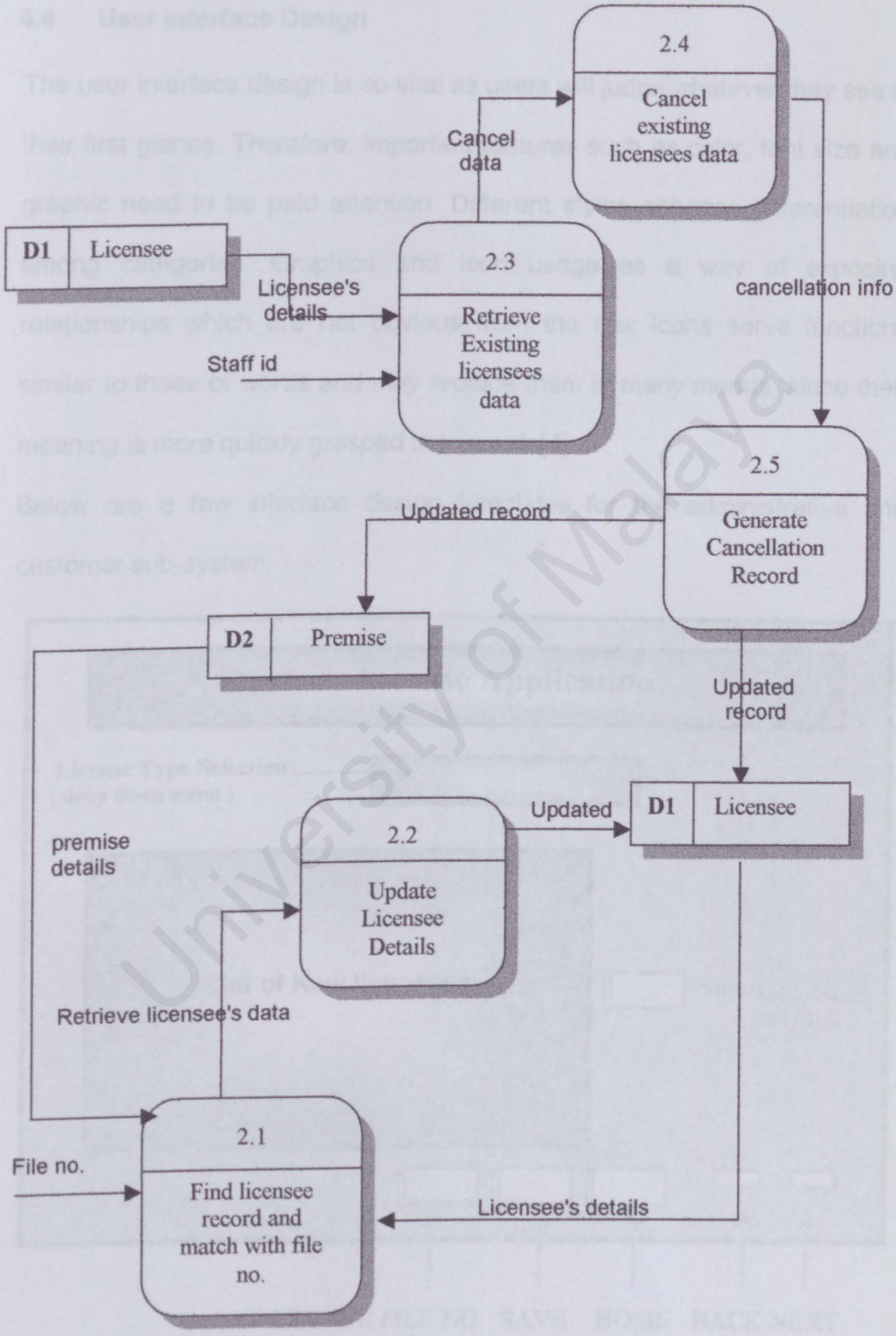


Figure 4.8 **Child Diagram for Process 2 of Diagram 0**

4.4 User Interface Design

The user interface design is so vital as users will judge whatever they see at their first glance. Therefore, important features such as color, font size and graphic need to be paid attention. Different styles enhance differentiation among categories. Graphics and icon usage as a way of exposing relationships which are not obvious from the raw Icons serve functions similar to these of words and may replace them in many menus, since their meaning is more quickly grasped than words[4].

Below are a few interface design templates for the administrative and customer sub-system.

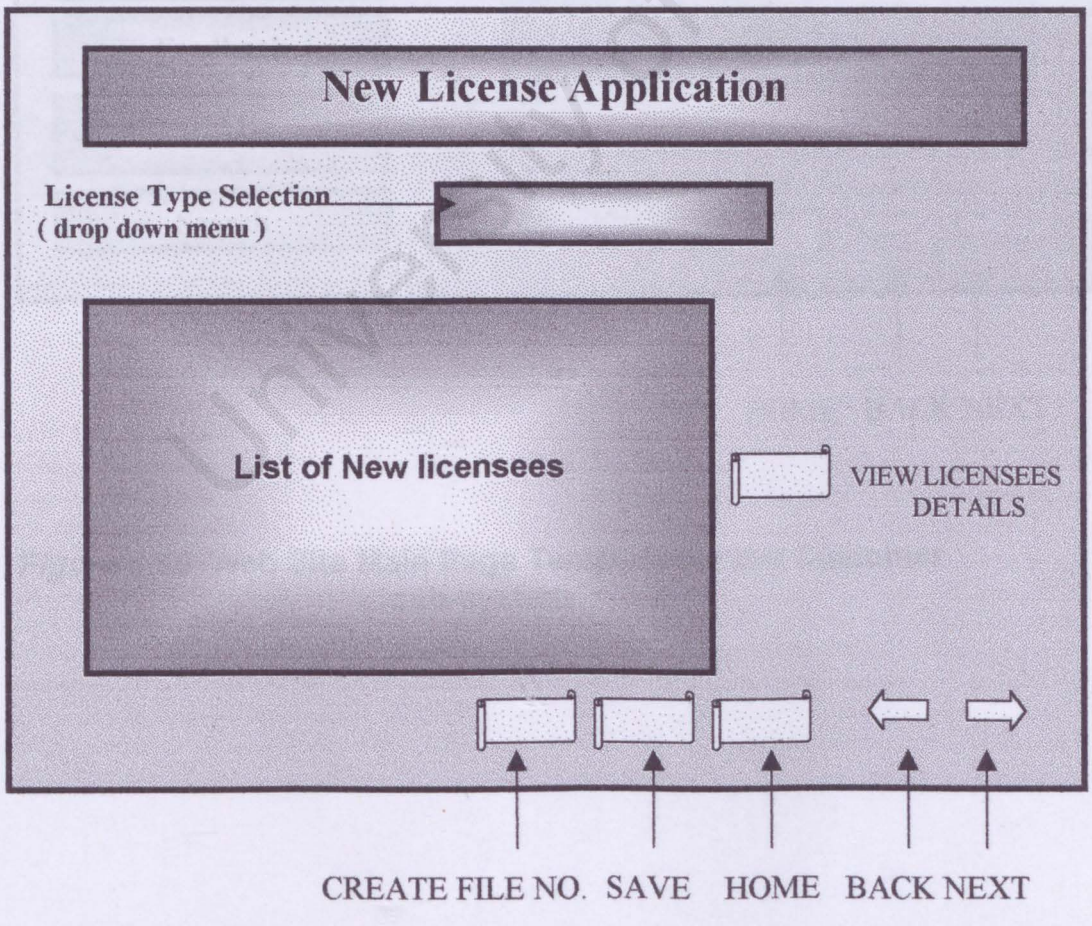


Figure 4.9 **New License Application Tab Screen Template for the administrative sub-system**

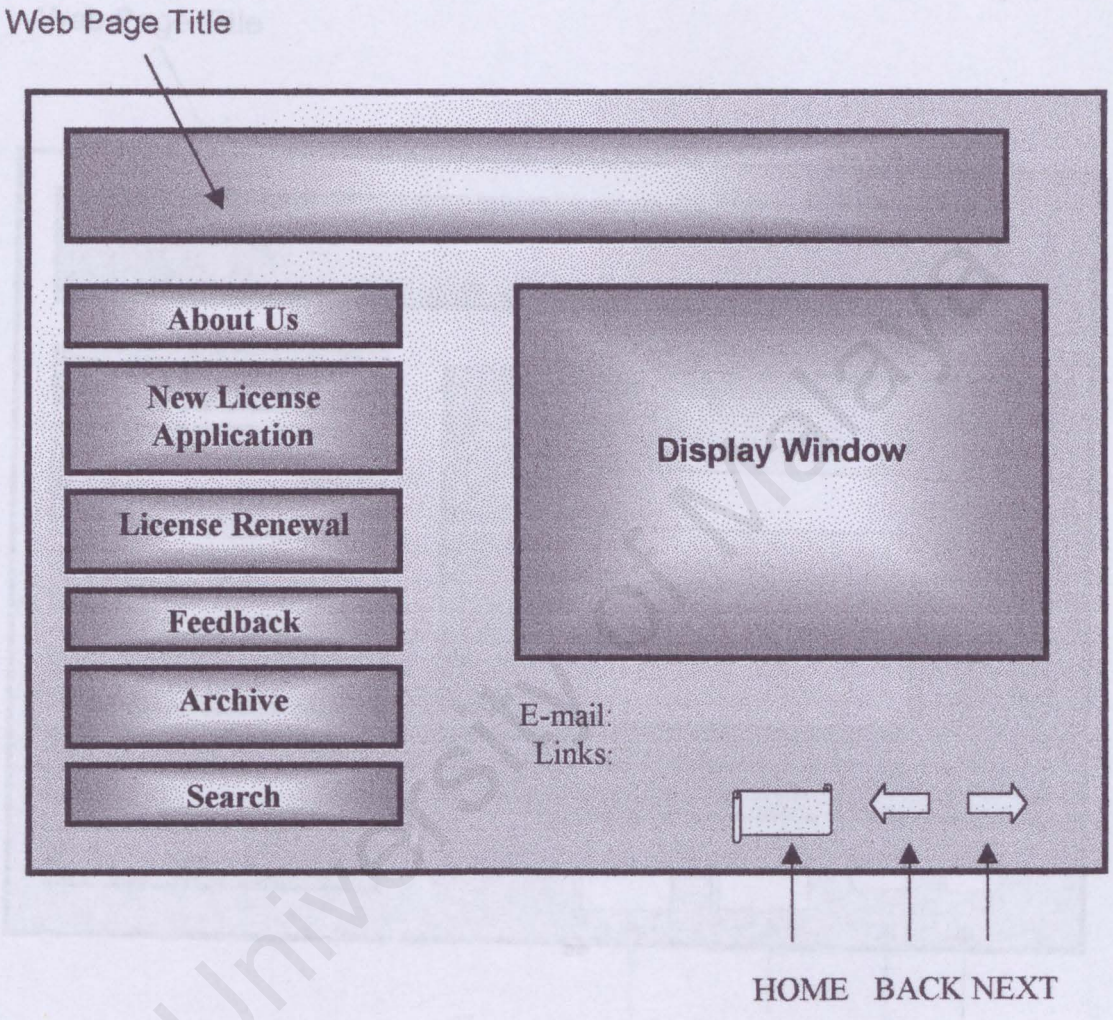


Figure 4.10 **Web Site Main Page Template for the Customer sub-system**

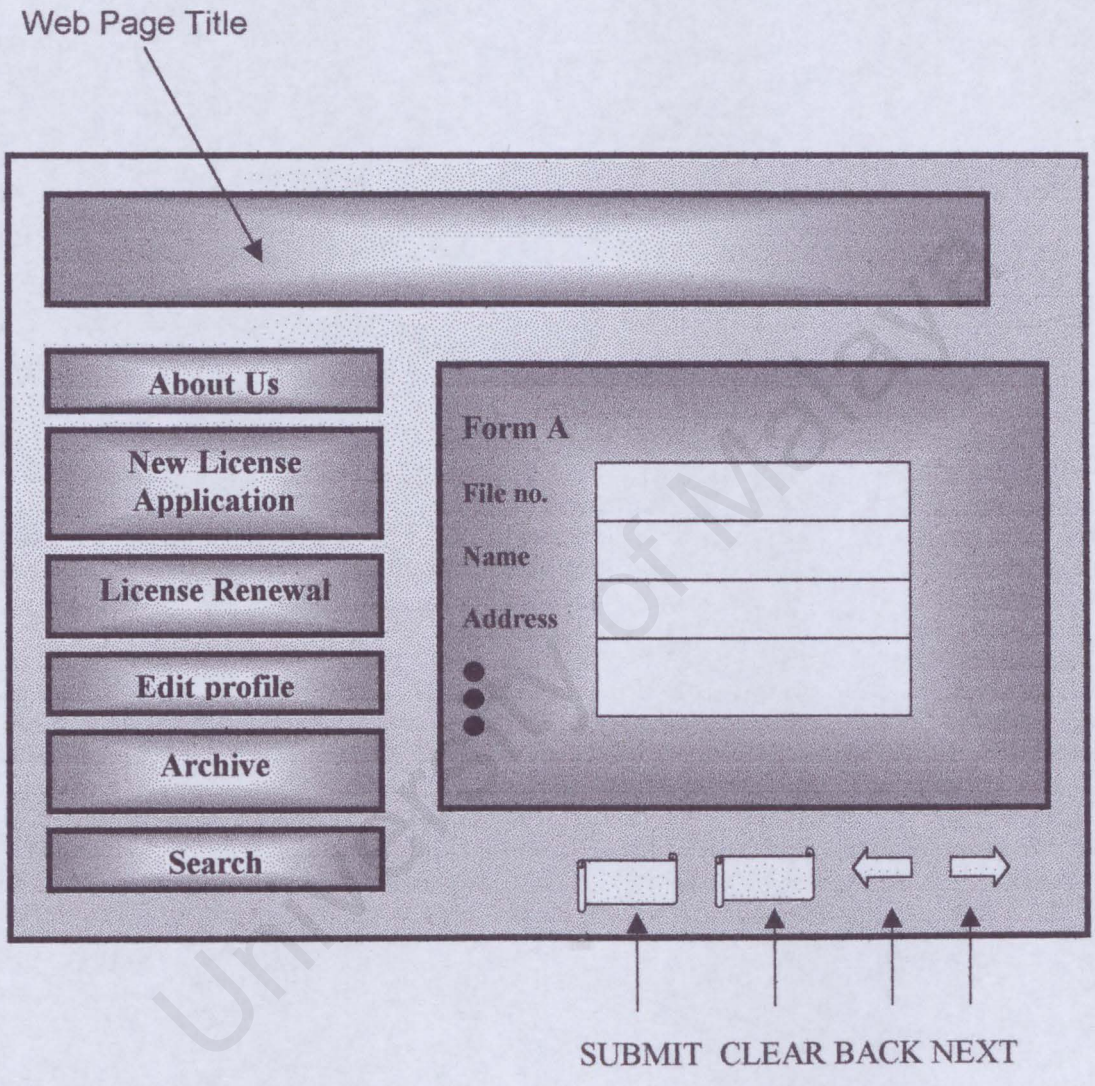


Figure 4.11 **New License Application Template for the Customer sub-system**

System Implementation

Chapter 5 System Implementation

Implementation phase takes place after the system design phase. This phase comprises the development of the Licensing System, coding methodology and development tools involved[19].

5.1 Development of the Online Licensing System

Since the Online Licensing system is classified as a web application most of the scripts are coded using HTML, server-side scripting and client- side script that would support and enhance web application. Here are brief description about these scripting languages:

5.1.1 HTML

HTML is the most common standard use for developing interface of web application since it is essentially a scripting language that marks up a web page with formatting command and these commands are supported and interpreted by most web browser. [14]By using HTML, web sites may include colorful and animated graphics that makes the web page more attractive. In addition , HTML also is used to generate frames that is used to navigate links from page to page.

5.1.2 Server-side scripting

[1]As mentioned in the previous chapter, ASP(Active Server Pages) is a server side scripting that is embedded in the HTML scripts. ASP codes locate within the delimiter <%....%> in the HTML scripts are invisible to the

client and executed in the server, hence its name server-side scripting. Thus, ASP is suitable to be used in Online Licensing system to execute licensing process on the server and produce consistent results regardless of the browser used by client. In addition, ASP enable secure web application generated for the Online Licensing system.

5.1.2.1 Request object

There are a few ASP objects that is applied in the Online Licensing system application. Request object is one of them, which is used to deal with a licensees especially during the application and renewal process. Request Object is used to retrieve specific query data from a calling client using the Form and QueryString collections .The request object is responsible for packing all the information and making it easily accessible to the application with request objects, Online Licensing System can read user input, process the data and update database with the data. This is how data is retrieved from the application form using Request Object

```
appName = Request.form( "appName" )
```

5.1.1.2 Response Object

The response objects encapsulates data that a script sends to the calling browser. The examples of properties and method of the Response Objects.

Response.Write

```
Response.Write("string to send back to the calling client")
```

Response.Redirect

Response.Redirect(*newURL*)

5.1.1.3 Session Object

For the data that needs to be shared between different pages, but not necessarily between different clients Online Licensing System make use of the session object. [13]Each client that requests a page from Online Licensing System is assigned a session object. A session is created when the client first makes a document request and destroyed, by default, twenty minutes after their last request was received. This session object is used to indicate authentication of a lecturer. For Online Licensing System, a session only starts after an administrator successfully logged on the system and has booked successfully. After the session end all the information stored in the session will be lost and administrator are required to log on the system again to start . Session objects are not applied for visitors who only can browse the Online Licensing System web pages but do not need to log on the system. The syntax for declaring a session level variable is

Session("VarName") = SomeValue //represents a value assigned to the session variable

5.1.2.4 Dictionary Object

[13]The *Dictionary Object* allows us to simplify the way we work with arrays of data. It is an object that is very much like a *Collection* object. In this

system, The *Dictionary Object* is a useful tool, particularly when the submitted data is processed from an HTML form. The example of using the *Dictionary Object* in processing HTML Form data;

```
<%
Dim dct
set dct=CreateObject("Scripting.Dictionary")
for each k in Request.Form
dct.Add k, Request.Form(k).item
Next %>
```

*//*This is how you traverse a *Dictionary Object,* dct:

```
<%=dct("poskod")%>
<%=dct("city")%><BR>
<%=dct("state")%>
```

5.1.2.5 ADO objects

Another important ASP object that uses Online Licensing System is Active X Data Objects(ADO), which is really a connection mechanism that provides access to database. ADO is powerful enough to achieve excellent results with a minimum amount of work. Thorough ADO objects, Online Licensing System can easily connect to the database by its connection object and create recordset object to manipulate with the database. With the recordset object, Online Licensing System can easily retrieve data from database with complex SQL statement, create, update and delete records in the database. Besides , recordset also enable record finding and filtering.

5.1.3 Client-side scripting

Besides using server side-scripting in Online Licensing System application, client side scripting , such as VB Script and Java Script are also embedded in the HTML codes.. Client-side scripting can be used to do interactive tasks such as validate users' input and checking form completeness prior to sending the HTML form to the web server

Since client-side is interpreted by user browser and does not send to the Web Server for processing , the efficiency of Online Licensing System is improved and enhanced with the using of client-side scripting in the Online Licensing System application. Client side script helps to reduce user requests that need to be sent to the server and get response from the server. Besides saves the server resources, client side script also provides a better and quick response to the user.

5.2 Structured Programming

Structured programming is a problem solving strategy following two guidelines:

- The flow of control in program should be as simple as possible.
- The construction of program should embody top-down design. Top down design also referred to as stepwise refinement, consist of repeatedly decomposing a problem into smaller problem. Eventually, one has a collection of small problems or tasks, each of which can be easily coded.

The disciplined approach is structured programming improves program clarity and maintenance. It is easier to design in the beginning and easier to

maintain. Besides, structured programming increase the coding readability that easier to understand and less likely to contain errors. In structured programming, obscure tricks and programming shortcuts are strongly discouraged.

5.3 Development Tools

5.3.1 Visual Interdev 6.0

Visual Interdev is the most appropriate tool for developing Online Licensing System, which is Web application that is written in ASP Scripts.It is because Visual Interdev, which comes as a part of Microsoft's' suite of professional programming tools, Visual Studio, is actually the tool that has everything that is needed to design and build a great looking, dynamic and easy to navigate World Wide Web Site.

Three different views, which are design view, source view and quick view of Visual Interdev provides a convenient and user friendly environment for developing web application. In the design view, a graphical interface can be easily executed and edited by just dragging and dropping textbox, button and other tools from the tool box to the work space without the knowledge of web scripting.Visual Interdev will automatically generate codes for the design. However, developers still manage to view and edit the codes at the source view. Interdev will actually check, verify and correct syntax, mistakes in the HTML codes when the script is saved. Besides, Interdev also provide debug tool for debugging ASP scripting in the quick view, Visual Interdev display interfaces as they would appear in the web browser and interface actually

appear in the web browser and interface actually could be tested in this view. However, this view is only valid for pure HTML codes and client-side script since they executed as by the browser. In addition ,Visual Interdev also includes wizards, templates and gallery pages which further easier development process especially for newcomers to learn and require less time to maintain.With Visual Interdev, the process of Online Licensing System is actually speed up if compared to conventional programming system, which is text-based, where the user interface can only be controlled through command of programming language.

5.3.2 Microsoft Frontpage 2000

Instead of Visual Interdev, MS Frontpage was also used for designing web pages in Online Licensing System. It is chosen due to its simplicity to build complex Web sites, complete with discussion forums and database features. Of interest to advanced HTML coders, the latest version of FrontPage is the first that doesn't interfere with their personal coding styles or modify hand-coded HTML.

Besides that, FrontPage combines a WYSIWYG page editor with Explorer-style site management tools that automatically update hyperlinks and navigation bars when you rearrange or add pages to a site. Previous versions used separate windows for the editor and site manager, but the new version combines them in a single convenient interface. Earlier versions, by default, saved Web sites to a Personal Web Server (PWS) on the local hard disk, a feature that confused beginners. The new version defaults to saving

Web sites to an ordinary folder on the local hard disk, but supports PWS for testing features like discussion forums that work only from a Web server.

The new version supports changes to font, color, background image, and other theme features in the same dialog used for selecting themes. Color schemes can be created or modified, with browser-safe colors (ones that won't be dithered on 256-color displays) listed by default. FrontPage's automatically generated navigation bars are easier to use, but still don't let you create a button for a page outside a Web site unless you know how to create the button by hand.

However, A few minor inconveniences remain in this new version. The extensive help system won't pop up while you're using a dialog box, which is when you may need it most. Because of the way FrontPage stores temporary files on disk while you edit, it sometimes can't preview framed pages that use JavaScript to control the frame set in which they appear.

It's the one package that builds complex and professional-looking Web sites with minimal effort and maximal results.

System Testing

Chapter 6 System Testing

System testing is a critical phase that ensures the system fulfills user requirements. It is a process of executing a program with the intent of finding errors.

Basic Terminology In System Testing[20] :-

- **Validation** – It involves of checking whether the programs meet the expectations of the user and the customer.
- **Verification-** It refers to the set of activities carried out to ensure the software implements specific functions correctly.
- **Fault-** This occurs when a human makes a mistake, called ***error***, in performing some software activity.
- **Failure** – It is a departure from system 's required behavior

A successful test is one that uncovers an as-yet undiscovered errors. Therefore, a systematically test procedure is needed to make sure the system tested thoroughly and completely. For Online Licensing System, system is divided into subsystem modules and write to enable testing procedures carried out immediately in conjunction with system implementation. The most widely used testing process consists five stages including unit testing, module testing, subsystem testing, system testing and acceptance testing. Unit testing and module testing are usually grouped component testing and system testing. Acceptance testing is the last stage of the testing procedure, which is tested by users and thus also named as user testing.

The testing process is normally started at the component testing to ensure the code implemented the design properly. [19]This is followed by integration testing, which is tested for the overall functionality and performance of a few modules that are integrated together. Then, the testing process is end up with user testing to ensure that the system does what the users want it to do. If mistakes or defects are discovered at any stage one stage, the previous stages might need to be repeated for modification and correction. There are several stages in testing the Online Licensing System.

6.1 UNIT TESTING

It focuses on all the individual modules. [5]This enables to detect errors in coding and logic that are contained within the functions of a module alone. The tests that are executed during the unit testing are interface testing, local data structures, boundary conditions, independent paths and error-handling path tests.

6.1.1 INTERFACE TESTING

[19]The module interface testing in Online Licensing System is to ensure that information properly flows in and out of the program unit. For example, testing will be conducted to ensure that the data that was retrieved from the database are properly displayed. Interface testing also ensures that the data that flows out of the module into the other modules of the application are correct. Besides that, the links those are created in an interface can be confirmed their target pages by running this testing. This is an important path

of the testing because all the pages fetched by the links must properly declared especially the ASP pages that only can be displayed properly if the pages are fetched from the server and not from a normal file folder.

6.1.2 Local Data Structure Testing

[20]The unit testing conducted on this application also serves to examine the data structure of the module to ensure that the data stored in the module temporarily maintains its integrity during the execution of the module.

6.2 INTEGRATION TESTING

Once unit testing has been completed, all the individual units are combined into a working system. The integration is planned and coordinated so that when an error occurs, there is some idea of where the error could have occurred. Integration testing is a systematic approach for constructing the program structure while simultaneously conducting tests to uncover errors caused by the interfacing. The primary concern is that the system meets its functional and non-functional requirements and also to reduce time in looking for errors for this system development

Integration testing for this application was done using the bottom-up approach. The modules at the lowest level of the hierarchy is tested individually first and then later all the individually tested modules are jointly tested. This approach was done repeatedly until all the modules are tested. This system allows faults to be discovered in each unit before combining them, which facilitates the tracking of faults when they occur.

6.3 USER ACCEPTANCE TESTING

[19]Users also involve in this stage to test the system to make sure that the system meets their understanding of the requirements, which may be different from the developer. Since this system is developed for the Pharmaceutical Service Division, Ministry of Health, target users involve the licensing officers and pharmacists. During the test, besides demonstrating the functionality of Online Licensing system to the users, the users may also experience online Licensing System themselves.

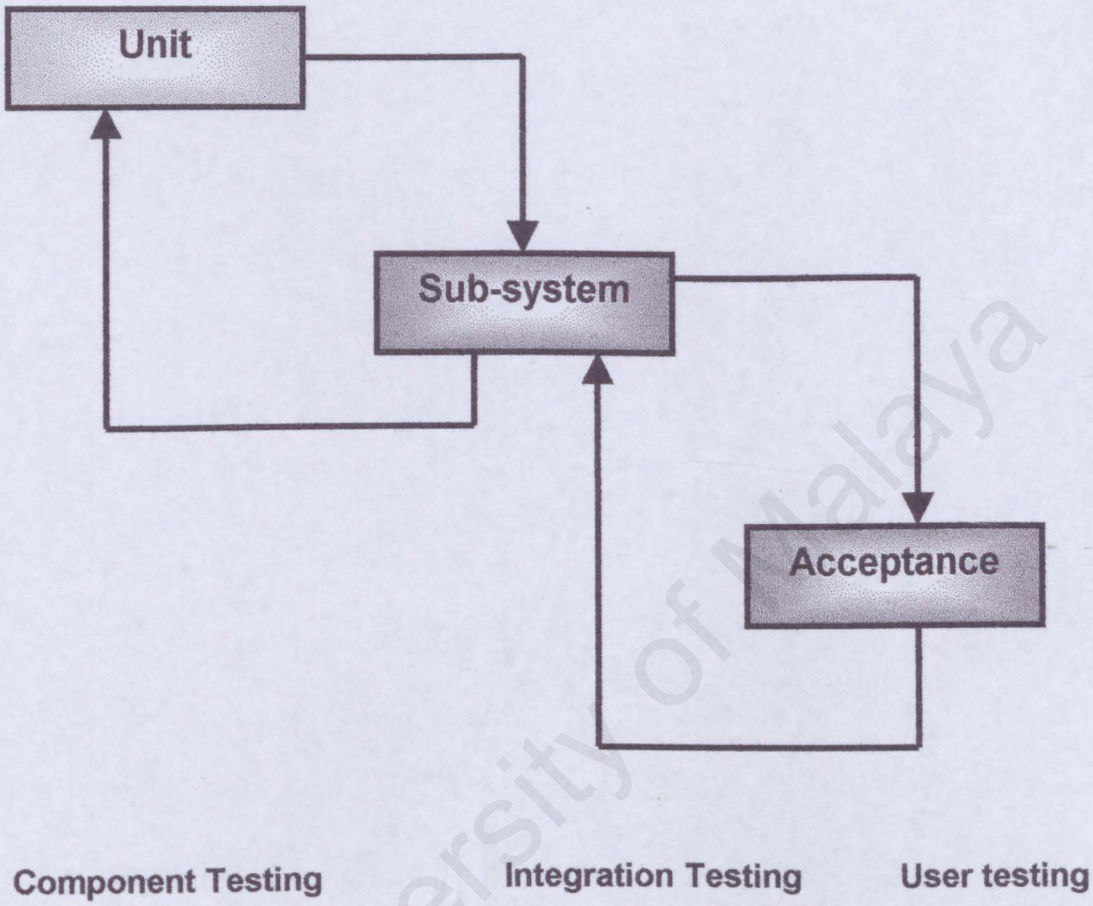


Figure 6.1 Testing Process

System Evaluation

Chapter 7 System Evaluation

Throughout the development of Online Licensing System, a lot of problems are encountered. However, most of them were resolved eventually. In this phase, Online Licensing System was evaluated to identify its strength, limitations and proposals were made for future enhancements.

7.1 PROBLEMS ENCOUNTERED AND SOLUTION

A number of problems were encountered throughout the development of Online Licensing System. Listed here are the problems encountered during the system development:-

7.1.1 Problems in tools and language selection

Since Web based programming is only started and popular in the late 1990s, the exposure and knowledge of Web based programming is really limited. Therefore, it is difficult for the author to select the most appropriate language and tools for the development of Online Licensing System. To gain more information of Web based programming and identify the most appropriate approach to develop Online Licensing System, in depth studies and research on the web based programming language was carried out in the earlier stage of the development. The studies and research activities including Internet surfing, reading topics related magazines and reference books. Besides, discussions with course mates and seniors were conducted to collect their opinions and ideas.

7.1.2 Lack of knowledge in the languages

Due to the time constraint, learning and developing process was done in parallel without strong base of the language, author has to spend hours in looking for solutions to solve problems that was occurred during the development of Online Licensing System. This usually happens to case related to concept of language that are new to the author, such as session object in the ASP scripting.

7.1.3 Difficulty in designing User Interface

Developing suitable standard and systematic user interface is a difficult task because the author has no experience in such development. Author was lack of knowledge of the real layout of standard user interface. The arrangement of the control and graphics on the web pages took a lot of time to meet the final standard, systematic and user friendliness interfaces. Both Microsoft Frontpage and MS Visual Interdev was chosen as interface design tools.

7.2 SYSTEM STRENGTH

7.2.1 User friendliness

In overall, Online Licensing System could be evaluated as a simple and easy to use application, unlike command based environment, such as MS-DOS, Online Licensing System provides simple, direct user friendliness and graphical based interface, and proper guidance especially to the novice users of the system .

In the environment of Online Licensing System, users are required minimum typing and input when using the system. Besides, that sufficient instruction and guidance are provided to guide and assist users.

7.2.2 Password Protected

The password protection is vital to disable any user from using another person's ID to gain access to certain sites. In Online Licensing System, this features is adapted in license renewal process whereby the licensees have to login in order to renew their license. At the same time, the administrative module is also password protected.

7.2.3 Reliable and Effective Error Discovery

The system is able to validate user input effectively. If user forgets to input a value especially while filling up the form, the system will give a friendly message to remind the user regarding the blank field.

7.2.4 Confirmation and Preview Pages

In the user module, the user will be able to preview the information that has been keyed in into the forms before submitting it. Instead of being able to preview the details , the user can also know whether their application or renewal has been successfully submitted to MOH. Besides the user module, these features are also adopted in the administrative module. The

administrator will be asked for confirmation before the system performs any task in order to avoid mistakes.

7.2.5 Multi-platform

The Online Licensing System pages can be accessed through any operating system platform such as Windows NT and Windows 98 and 95. Besides that, the system can be executed in most of the current browsers available such as Internet Explorer 4 and above and Netscape Navigator. Hence, there are some limitations occur here as Netscape doesn't support few of the features that are available in Microsoft Visual Interdev meanwhile the system are fully feasible when browsed in Internet Explorer 4 and above.

7.2.6 Reduce the burden of Web Server

Commonly used script in creating dynamic content of web pages is the Common Gateway Interface script or better known as the CGI scripts. CGI, by their nature, place an extra burden on the Web server. They are separate programs, which means the server process must spawn a new task for every CGI scripts that are executed. But, Online Licensing System dynamic contents are created by VB scripts and JavaScripts and the pages are named as Active Server Pages. As mentioned earlier, the ease in embedding the scripts in HTML coding and the compatibility between these two scripts reduce the burden of Web server in processing a task. This is because, the VB scripts comes in two different scripts, which are the server side scripts

and the client side scripts. Therefore, the execution of the client side scripts are faster because they are executed in the client browser and this will reduce the time of the execution of the related server side script. But CGI scripts only are executed on the server side and this will take a long time and automatically will increase the burden of the web server.

7.3 SYSTEM LIMITATIONS

Due to the time constraint and the constraints that occur while using Microsoft Visual Interdev with improper implementation environment, there are some limitations in Online Licensing System.

7.3.1 Limited Features

The Online Licensing System does not cover the overall function of licensing process conducted by Pharmaceutical Division . It only covers basic and general functions. Furthermore, only certain application forms are available in this system. This can't be implemented due to the time constraints and complexity of the forms.

7.3.2 Mailing Capabilities

Since PWS is used as the web server, the mailing capability cannot be added to the Online Licensing System.

7.4 FUTURE ENHANCEMENTS

The development of any system is always a dynamic process. Further improvement and new ideas have come across while the system was being implemented. However, due to time and source constraints, not all of these ideas could be incorporated

7.4.1 Online Payment Capability

For future enhancement, the Online Licensing System is expected to be able to provide online payment capability for license application and renewal process.

7.4.2 Mailing Capability

In future, the Online Licensing System should provide mailing capability to enable users to contact the Pharmaceutical Division via e-mail.

7.4.3 File No. Generation Capability

This system is also expected to be able to generate file no for each licensee.

7.4.4 More Features

Since the Online Licensing System doesn't cover the overall licensing process conducted by MOH, this system is expected to perform more functions in future. More forms will also be added into the system in order to meet the customer needs.

7.5 KNOWLEDGE AND EXPERIENCE GAINED

Throughout the development of the Online Licensing System, lots of knowledge and experience have been gained;

- Gained in-depth information on the role of internet and web-based application and its importance in performing online functionalities.
- Exposed to a new programming language ; Active Server Pages
- Exposed to the usage of SQL queries and database design
- Gained ability and confidence in designing the user interface using MS Frontpage and MS Visual Interdev.
- Exposed to the usage of Personal Web Server in developing dynamic web-based application.

7.6 CONCLUSION

As a conclusion, the Online Licensing System has achieved its overall requirement as proposed in WXET3181. Now, the users do not have to apply or renew their licenses via traditional mailing system. Instead of improving the licensing process, this will also save time and enable a more effective licensing process by utilizing the Internet technology.

Besides improving the current procedure of applying and renewing, it is also undeniable that the development of the Online Licensing System has increased the awareness and knowledge in I.T field. The programming and

software engineering skills have been very helpful in making this project a success.

Overall, I would like to conclude that this project paper allowed me to apply the theories and programming skills I learnt before. I realize that teamwork spirit is an important tool to achieve common objectives in project development.

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User Manual

User Manual- Online Licensing System

TABLE OF CONTENT

1.0 INTRODUCTION

The Online Licensing System for Pharmacy Division, Ministry of Health (MOH) is a web-based online application, which is developed to automate the licensing process via the Internet. The user-friendly interface allows the new applicants and existing license holders to apply and renew licenses in a more systematic and easier way. The main strength of this system is undeniable as it utilizes the state-of art form of information dissemination in this era, the Internet

This application is easy to use. All the procedures and functions are well-defined and can be executed by a single point and click and a few typing afford on the various kind of input element that can be found in **The Online Licensing System** This manual will provide a brief guidance on how to **The Online Licensing System**

1.1 Minimum Hardware Requirement

1. Personal or multimedia computer with Pentium processor
2. MODEM/NIC to connect to the Web Server.
3. 32 MB of RAM
4. Super VGA higher-resolution video adapter (Super VGA, 256-color display Monitor)

5. Three Buttons Genius Mouse

6. Standard Windows 98 Keyboard

7. Hewlet Packard 400 Deskjet Colour Printer

1.2 Minimum Software Requirement

1. Microsoft Windows 98 or later

2. Microsoft Internet Explorer 4.0 or later

If there is no Microsoft Internet Explorer available in your computer, any other JavaScript enabled Web Browser can be used or you can download the application from :

http:://www.mircosoft.com/downloads.htm

2.0 ABOUT THIS USER MANUAL

This User Manual is divided into two main section

2.1 The User Module

This section describes the guidance to be followed by the common users to navigate and execute the services provided by Online Licensing System.

2.2 The Administrative Module

This section provides all the activities for the administrator of this website to access the data that are stored in the Online Licensing System database and perform any preferred changes on the data stored. In order to access to this module the respected user must obtain his/her user identification and login password.

3.0 GETTING STARTED

Before you explore the two main sections above, here are the instructions on how to get into the **Online Licensing System**.

Before accessing **Online Licensing System** your computer must meet the minimum hardware and software requirements stated in this manual. This manual uses the Microsoft Internet Explorer version 5.0 as the Web Browser to show the examples and figures.

3.1 THE USER SECTION

Before accessing the **Online Licensing System**, you need to fire up your Web Browser. Then in the URL address input box, type in the **Online Licensing System**'s web site address to access the application's homepage

The URL address of the **Online Licensing System is :**

http://anx741/Licensing/index.asp

This Web Browser will contact the server and connect to the server if the server is available and activated. If the access is activated, your Web Browser will display the first page of Online Licensing System that shown in *Figure 1.1*

Figure 1.1

Listed below are the brief description about each function of the buttons in the user section:

3.1.1 Search

- This function enables the user to search for the nearest Ministry of Health's(**MOH**) branch by state.
- To perform this search function, user has to select the state from the dropdown menu as shown in Figure 3.2

Figure 3.2

- After the selection is made, the user has to click on the SEARCH Button to proceed.
- The Search Results will return *all* the MOH branch addresses that fit your search criteria.

3.1.2 About Us

- This section briefly describes the mission, background, objective and resources (manpower) 0f the Pharmaceutical Service Division, MOH.

3.1.3 Legislation

- This section comprises all the rules and regulation practiced by MOH to ensure the import, manufacture, sale, supply, management, and use of pharmaceuticals, cosmetics and health-care products are conducted in accordance to existing national legislation

3.1.4 Statistics

- This section enables the user to view statistics and graphs of the number of license/permit issued by year.
- In order to view statistics and graphs of certain years, the user has to click on the respective year as shown in **Figure 3.3**

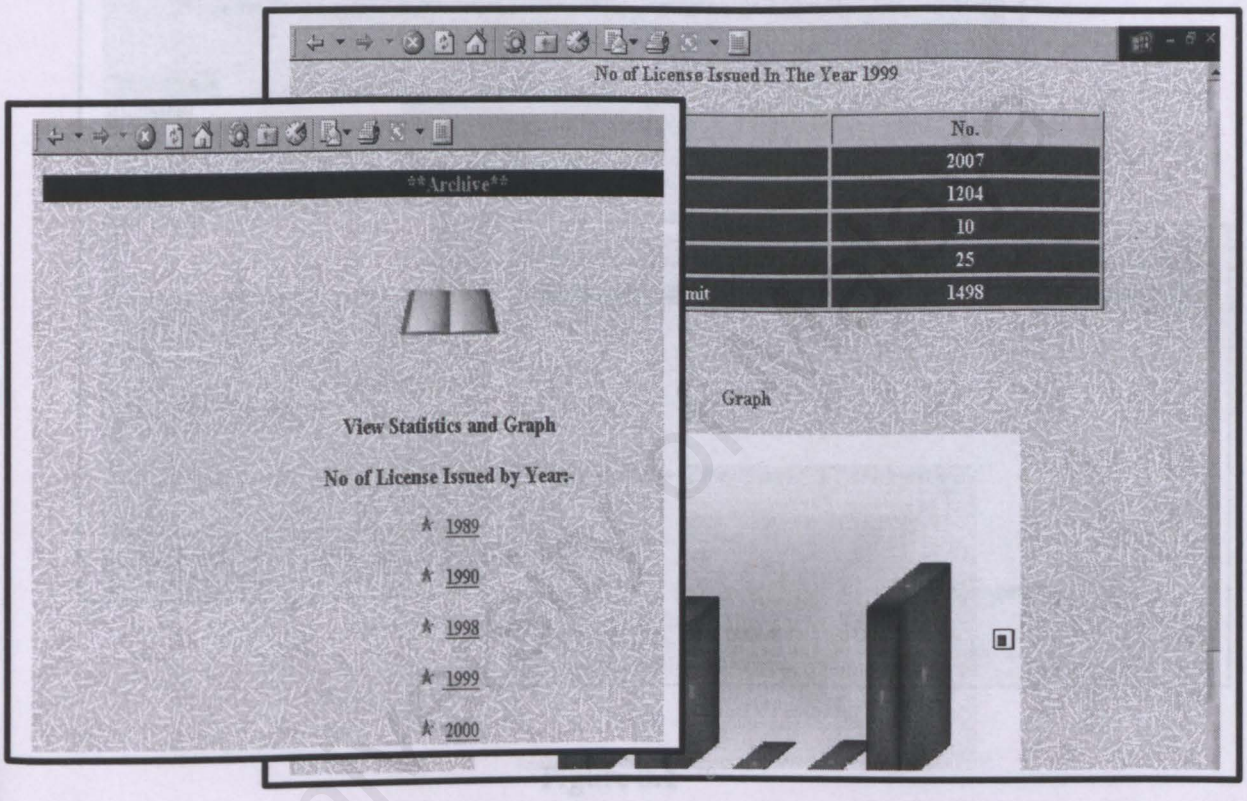


Figure 3.3

3.1.5 Frequently Asked Question

- This section comprises the frequently asked question by the licensees regarding the enforcement and licensing process carried out by MOH.

3.1.6 Feedback

- This section allows the user to send feedback to either improve the website or the service provided by MOH. **Figure 3.4** shows the feedback form mentioned above and the confirmation page:

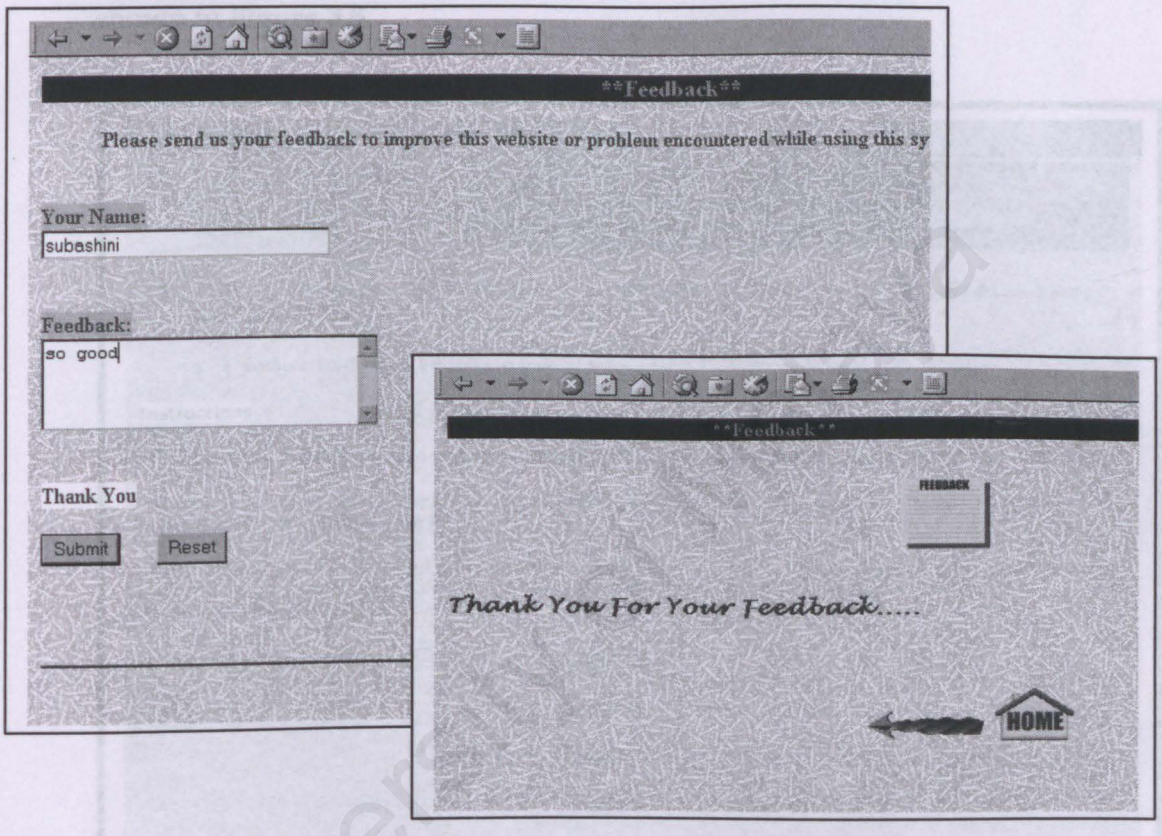


Figure 3.4

- Click on the SUBMIT button to submit the feedback

3.1.7 New License Application

- This section enables the users to apply their license online.

- In order to perform this task, the user has to click on the License Application button in the main page. Before starting the license application process, users are required to read the instructions and select the appropriate license type they want to apply for: This is shown in **Figure 3.5**

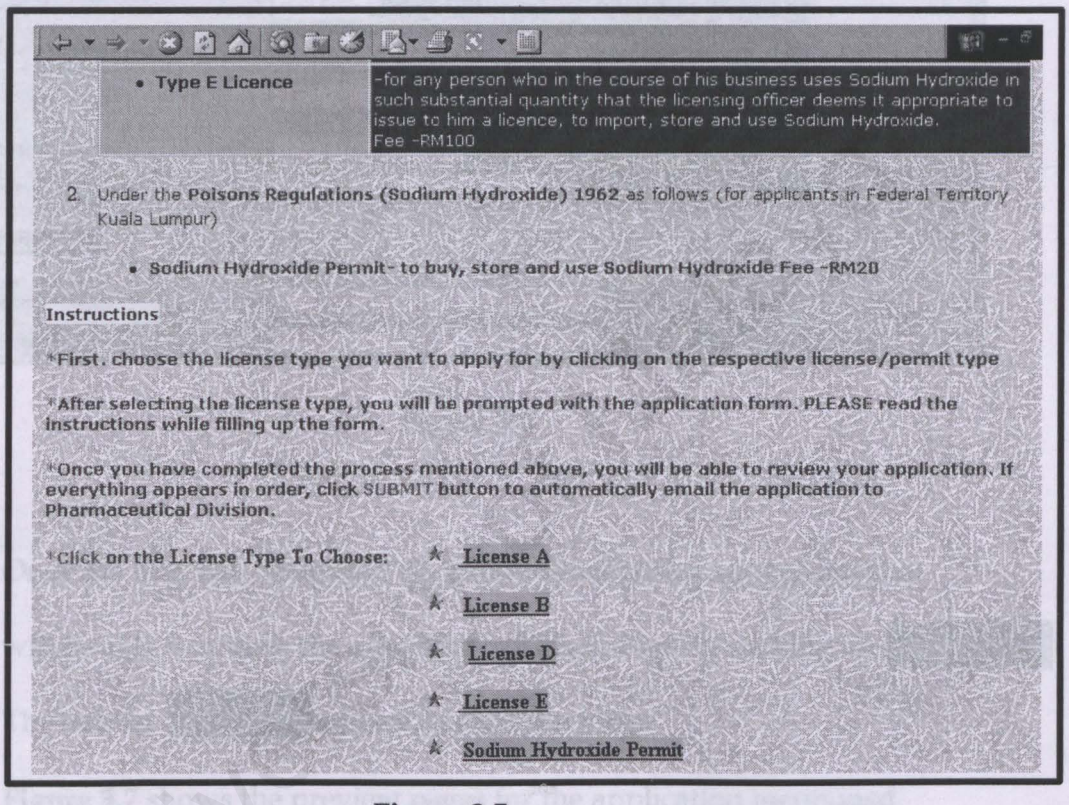


Figure 3.5

- After selecting the license type, the users will be prompted with the application form. Information are required for all the * fields. **Figure 3.6** shows the application form for **license Type A.**

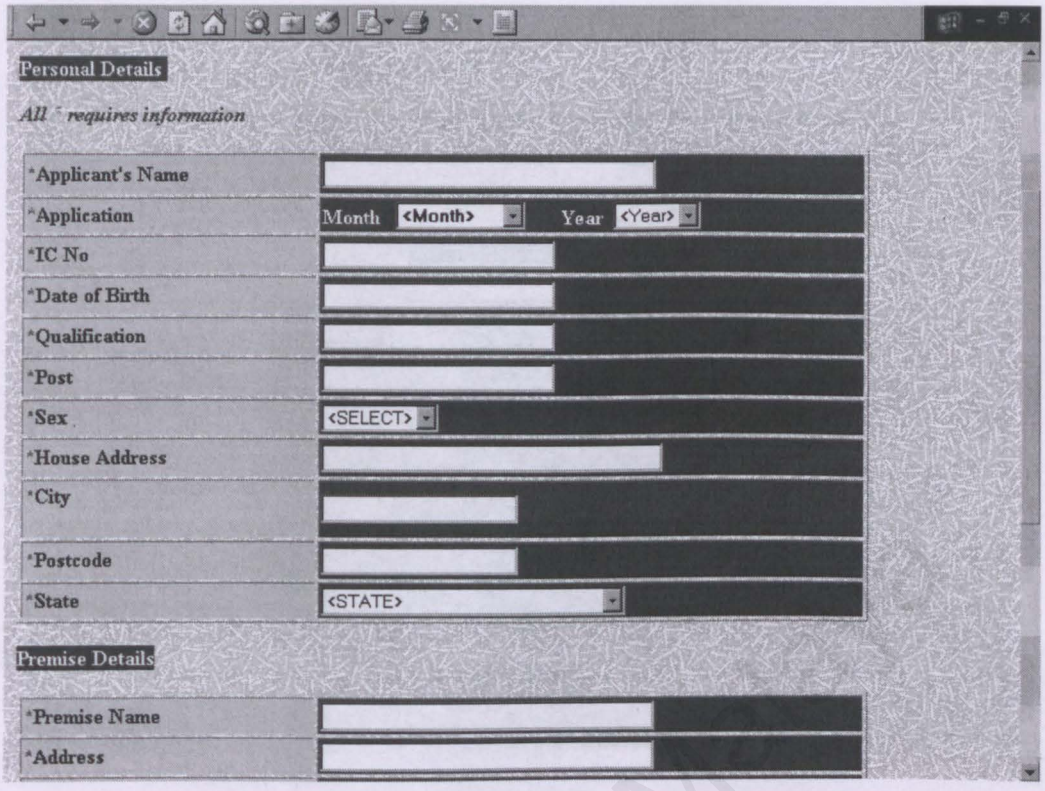


Figure 3.6

- Once the user has completed the process mentioned above, he/she will be able to review the application. This is done by clicking on the PROCEED button. The button RESET is used to clear the form.
- Figure 3.7 shows the preview pages for the application mentioned above

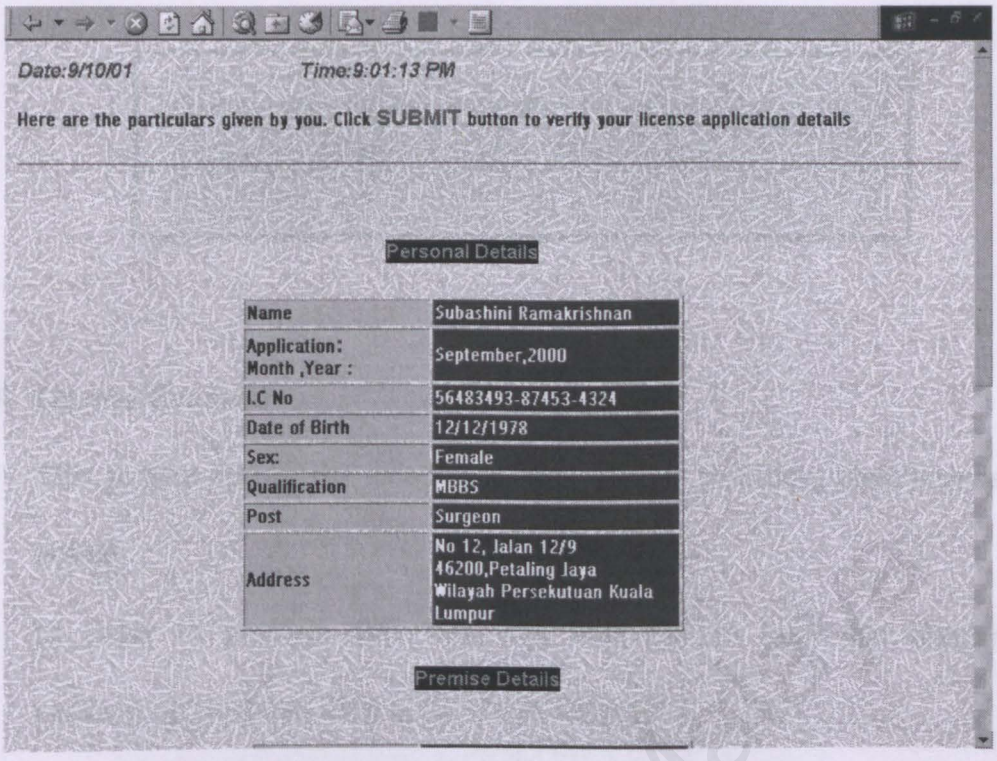


Figure 3.7

- If all the details appear in the correct order, the user has to click on the SUBMIT at the bottom of the page in order to submit the application to MOH.
- Otherwise, the user can edit the details by clicking on the icon.
- The HOME allows the user to go back to the main page.
- If the application process is successful, the user will be prompted with the confirmation page as shown in **Figure 3.8**

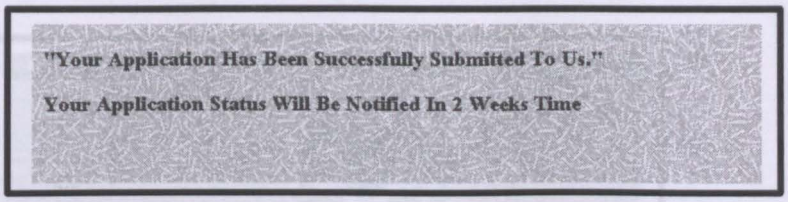
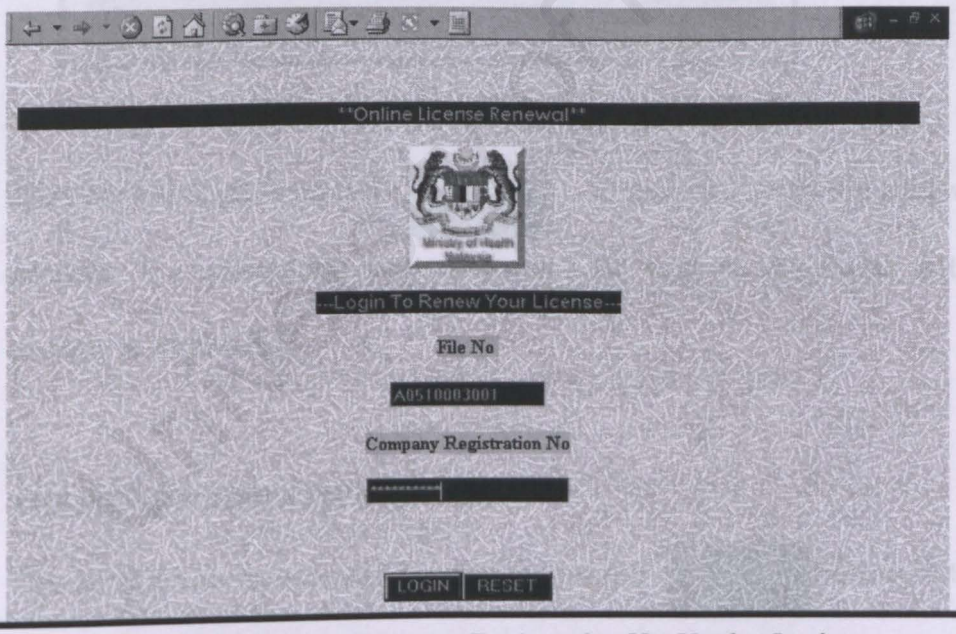


Figure 3.8

3.1.8 License Renewal

- This section allows the existing license holders to renew their licenses online.
- In order to perform this task, the user has to login for identity verification purpose. This is shown in **Figure 3.9**



The samples of File No. and **Company Registration No.** Used to Login
File No. : B0404009001
Company Registration No: 054-588787

- If the user verification process is successful, they will be prompted with the license renewal page to renew their license.**(Figure 3.10).** Otherwise, the user will be redirected to the login page to relogin.

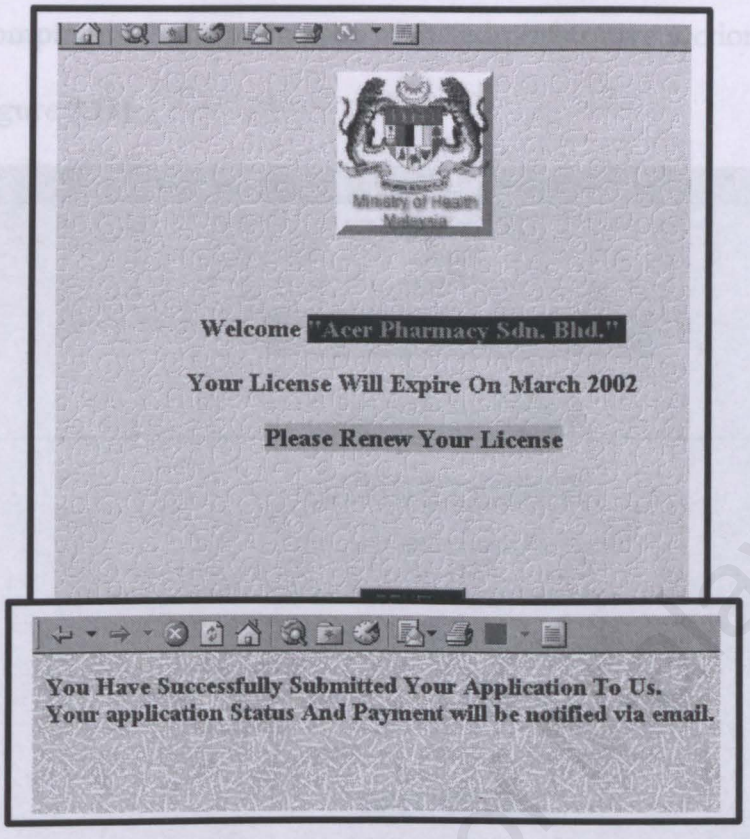


Figure 3.10

- The user has to click on the RENEW to proceed with the renewal process. A confirmation page (**Figure 3.10**) will be displayed if the process is successful.

3.1 THE ADMINISTRATIVE SECTION

- This section can be accessed by clicking on the STAFF button in the users main page.
- Before getting into the main page of the administrative section, login verification is required.

Samples of User Name and Password for Administrative Section:
User Name : admin
Password : admin1

- Once the verification process is performed, the authorized user will be prompted with the main page of the administrative section.

(Figure 3.11)

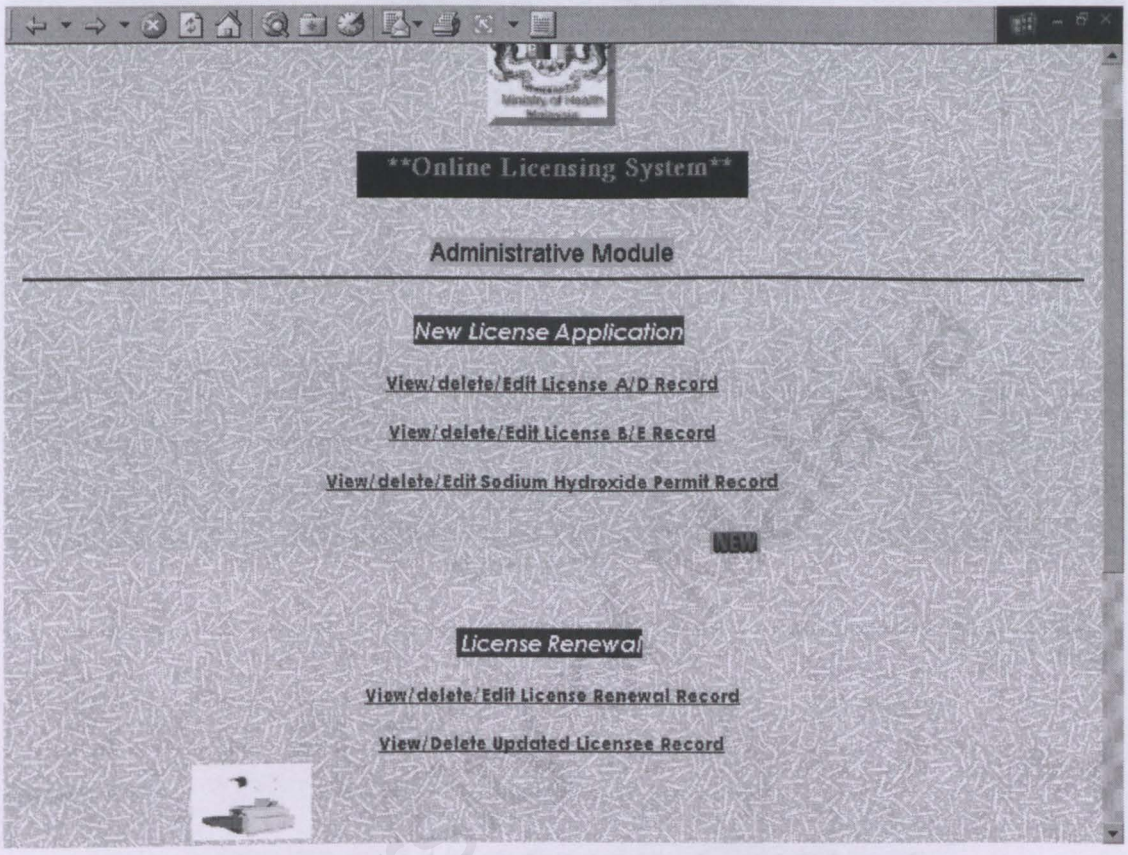


Figure 3.11

Listed below are the brief description about each function in the administrative section:

3.1.1 New License Application Record

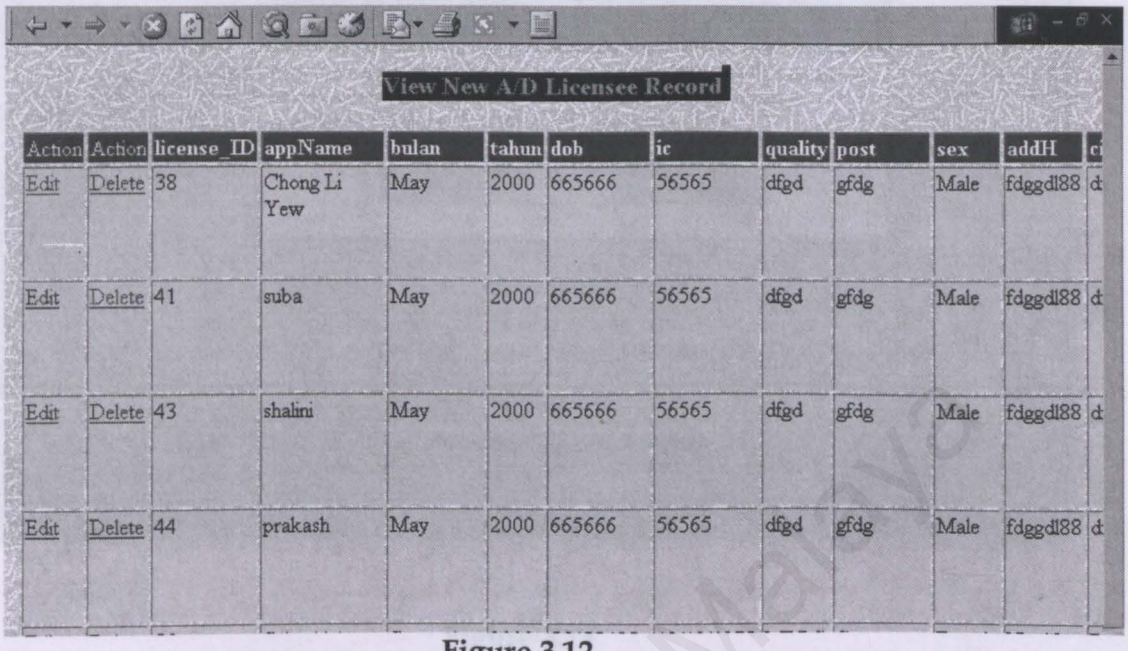
This section is divided into :

- View/Edit/Delete License A/D Record
- View/Edit/Delete License B/E Record
- View/Edit/Delete Sodium Hydroxide Permit Record

View/Edit/Delete License A/D Record

- This section allows the administrator to view/edit/delete the new License A/D Record

- After clicking on the **View/Edit/Delete License A/D Record** link in the administrative main page, admin are now able to view and perform the tasks mentioned above (**Figure 3.12**)



View New A/D Licensee Record

Action	Action	license_ID	appName	bulan	tahun	dob	ic	quality	post	sex	addH	ci
Edit	Delete	38	Chong Li Yew	May	2000	665666	56565	dfgd	gfdg	Male	fdggdl88	d
Edit	Delete	41	suba	May	2000	665666	56565	dfgd	gfdg	Male	fdggdl88	d
Edit	Delete	43	shalini	May	2000	665666	56565	dfgd	gfdg	Male	fdggdl88	d
Edit	Delete	44	prakash	May	2000	665666	56565	dfgd	gfdg	Male	fdggdl88	d

Figure 3.12

Delete

- To delete the licensee record, the administrator has to click on the Delete button at the left side of each record.
- Once the administrator select the delete the record, a message box (**Figure 3.13)** for delete confirmation will be displayed.

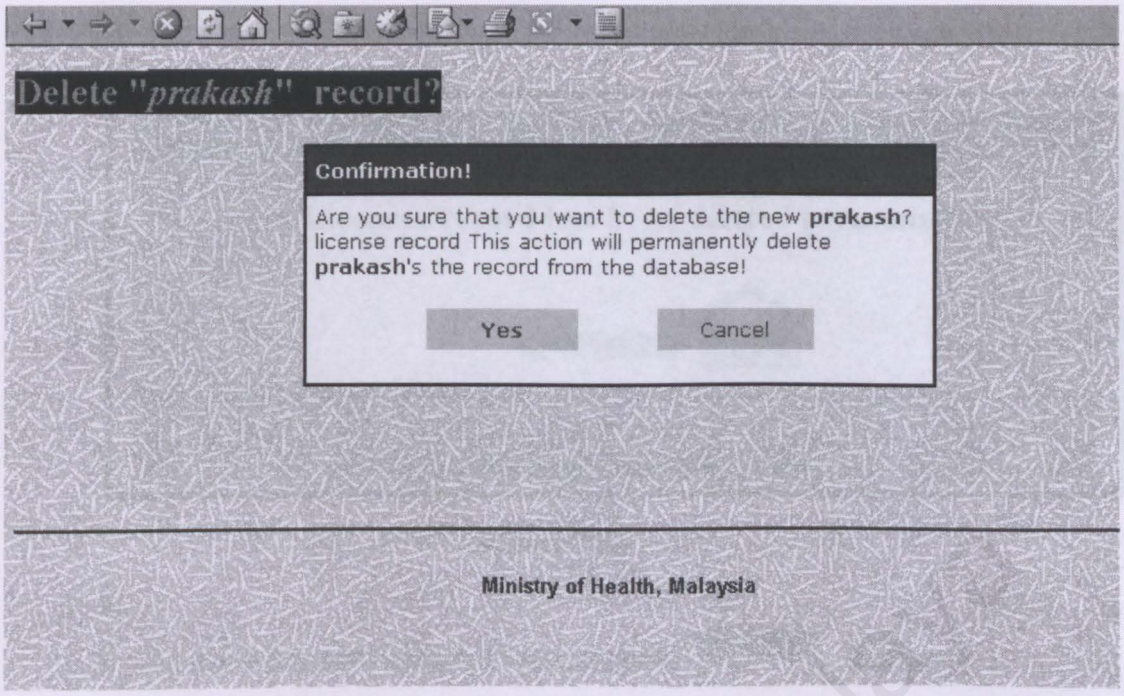


Figure 3.13

- To delete the record permanently, the user has to click on the YES Button . If the operation is successful, the confirmation page as shown in **Figure 3.14** will be displayed.
- To cancel the delete operation, click CANCEL

Figure 3.14

- To view the new updated record, click  button

Edit

- To perform this task, user has to click on the Edit button.
- Once the Edit operation is selected, admin will be prompted with the page as shown in **Figure 3.15**

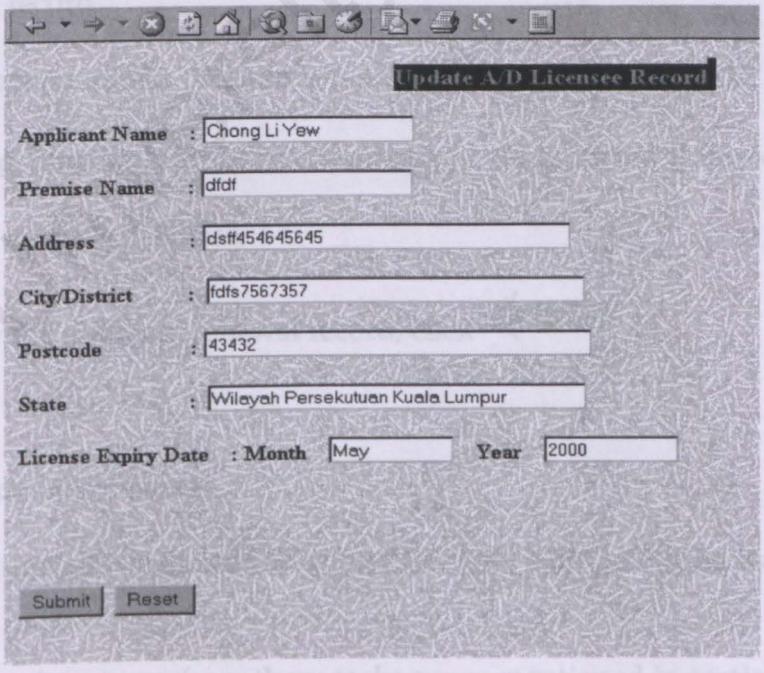


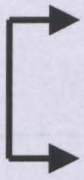
Figure 3.15

- Click on the SUBMIT button after performing the task.

The procedure of View/Edit/Delete Record for License B/E and Sodium Hydroxide Permit are same as described for License A/D

3.1.1 License Renewal Record

- This section enables the administrator to perform these functions



View/Edit/Delete License Renewal Record

View/Add/Delete Updated License Renewal Record

View/Edit/Delete License Renewal Record

- The procedure to perform this task is as explained in **section 3.2.1**

View/Add/Delete Updated License Renewal Record

- This section allows the administrator to view/add and delete the licensee record.
- The delete operation procedure is as explained in **section 3.2.1**
- The Add function enables the user to add the updated licensee record into the existing database.
- To view the updated renewal record, click  .

3.2.3 Feedback Maintenance

- This section allows the administrator to view/edit/delete the feedback record
- The procedure to perform those tasks are as mentioned in **section 3.2.1**

3.2.4 Access Control

- This section allows the user to view the user record.(**Figure 3.16**)

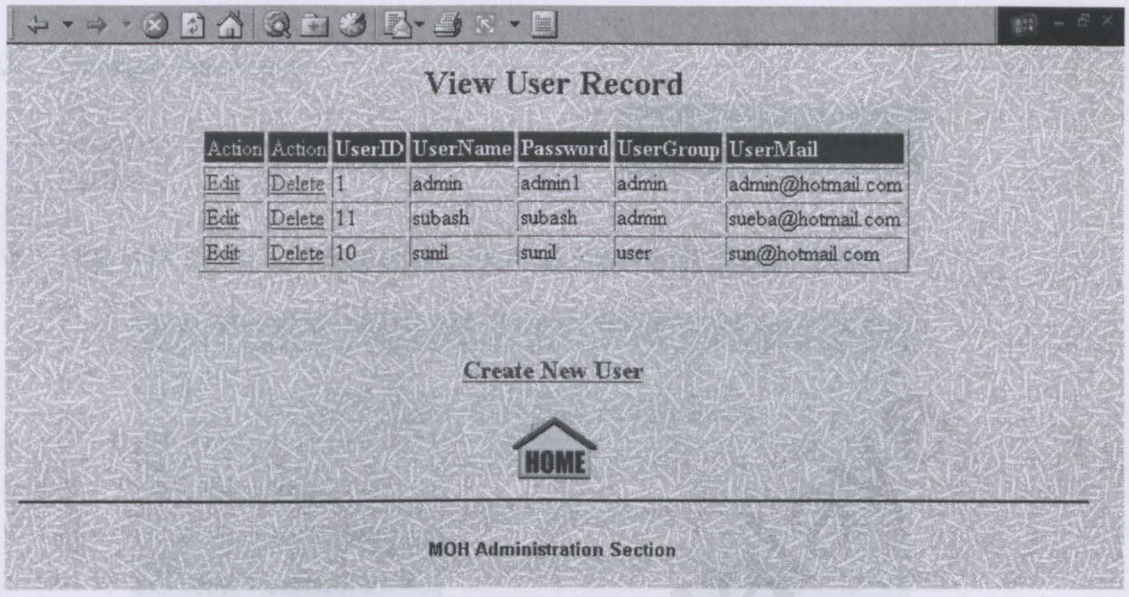


Figure 3.16

- The **Edit/Delete** operation are as same as mentioned in **section 3.2.1**
- This section also enable the administrator to **Create New User**
- Once the admin click on the **Create New User** link, user will be prompted with the form as shown as **Figure 3.17**

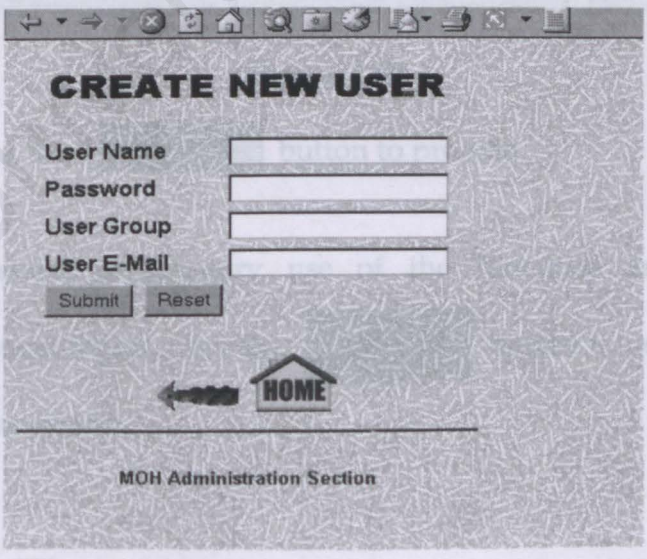


Figure 3.17

- Click SUBMIT button to proceed.

3.2.5 Change Password

- In order to perform this task, click on the Change Password button.
- This will bring the user to the page as shown as **Figure 3.18.**

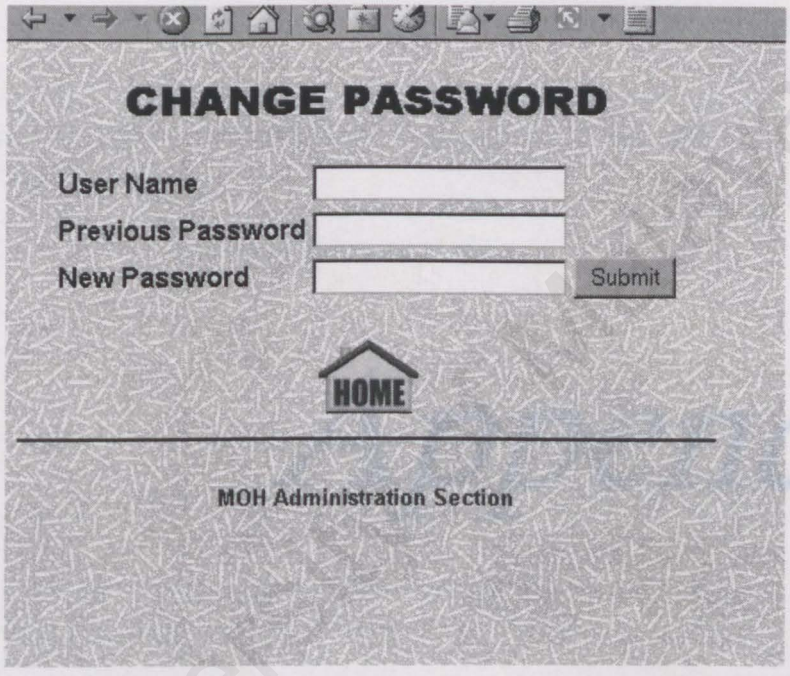


Figure 3.18

- Click on the SUBMIT button to proceed.

3.2.6 Logout

- To prevent unnecessary use of the functions and delays in subsequent logins, click the Logout button in order to log out from the system.

Appendix

Appendix 1 Sample code used for license A/D Confirmation Page

```
<%@ LANGUAGE=VBScript %>
<%response.buffer=true%>

<html>
<head>

<meta http-equiv="Content-Language" content="en-us">
<meta http-equiv="Content-Type" content="text/html; charset=windows-
1252">
<meta name="GENERATOR" content="Microsoft FrontPage 4.0">
<meta name="ProgId" content="FrontPage.Editor.Document">
<title>Success</title>
</head>
<body background="../../images/Acricepr.gif">

<%
 Dim Con
 Dim rs
 Dim sqlstr

' Get Form Fields

appName = TRIM( Request.form( "appName" ) )
bulan = TRIM( Request.form( "bulan" ) )
tahun = TRIM( Request.form( "tahun" ) )
ic = TRIM( Request.form( "ic" ) )
dob = TRIM( Request.form( "dob" ) )
quality= TRIM( Request.form( "quality" ) )
post = TRIM( Request.form( "post" ) )
sex = TRIM( Request.form( "sex" ) )
addH = TRIM( Request.form( "addH" ) )
city = TRIM( Request.form( "city" ) )
poskod = TRIM( Request.form( "poskod" ) )
state = TRIM( Request.form( "state" ) )
premis = TRIM( Request.form( "premis" ) )
jalan = TRIM( Request.form( "jalan" ) )
negeri = TRIM( Request.form( "negeri" ) )
daerah = TRIM( Request.form( "daerah" ) )
poskodp = TRIM( Request.form( "poskodp" ) )
tel = TRIM( Request.form( "tel" ) )
fax = TRIM( Request.form( "fax" ) )
emel = TRIM( Request.form( "emel" ) )
coregis = TRIM( Request.form( "coregis" ) )
asst = TRIM( Request.form( "asst" ) )
```

```
' Open Database Connection
'set rs= server.createObject("ADODB.recordset")

Set Con = Server.CreateObject( "ADODB.Connection" )

Con.Open "PROVIDER=MICROSOFT.JET.OLEDB.4.0;DATA
SOURCE=c:\Inetpub\wwwroot\licensing\administrative\licensing.mdb"

sqlstr = "INSERT INTO newAD(appName, bulan, tahun, ic, dob, quality, post,
sex, addH, city, poskod, state, premis, jalan, negeri, daerah, poskodp, tel,
fax, emel, coregis, asst)"

sqlstr = sqlstr & "VALUES('" & appName & "','" & bulan & "'," & tahun & ",'" &
dob & "','" & ic & "','" & quality & "','" & post & "','" & sex & "','" & addH & "','" &
city & "'," & poskod & ",'"& state & "','" & premis & "','" & jalan & "','"& negeri
&"','"& daerah & "'," & poskodp & "," & tel & "," & fax & ",'"& emel & "','" &
coregis & "','" & asst & "')"
%>


<p> </p>
<p><font size="4"><font color="#000000">
<marquee bgcolor="#FFCC00" direction="right" align="middle">New License
Application</marquee>
</font></font></p>
<p align="center"><span style="position: absolute; left: 332; top: 349"><a
href="../../index.asp"><img border="0" src="../../images/home.gif" width="60"
height="45" align="left"></a></span></p>

<%

  Con.execute(sqlstr)
  Response.write "<p> </p><p><b><font size='4'
color='#0000FF'>&quot;Your Application Has Been Successfully Submitted
To Us.&quot;</font></b></p><p><b><font size='4' color='#0000FF'>Your
Application Status Will Be Notified In 2 Weeks Time
</font></b></p><p> </p>"

  'Response.Redirect("confirm.asp?Result=Success")
  Con.close

 'rs.close
%>

</body>
</html>
```

Appendix 2 Sample codes used in license renewal process

```
<html>
<head>
<meta NAME="GENERATOR" Content="Microsoft FrontPage 4.0">
<title></title>
</head>
<body background="../images/Acricepr.gif" link="#000000" vlink="#000000"
bgproperties="fixed">
<% Uld =Request.form("UserId")

  Set Con = Server.CreateObject( "ADODB.Connection" )
Con.Open "PROVIDER=MICROSOFT.JET.OLEDB.4.0;DATA
SOURCE=c:\Inetpub\wwwroot\licensing\administrative\licensing.mdb"


' Create Recordset

Set RS = Server.CreateObject( "ADODB.Recordset" )

RS.ActiveConnection = Con

RS.CursorType = adOpenStatic

'RS.LockType = adLockPessimistic

   ' create the SQL string
   strSQL = "SELECT premis  FROM premis WHERE UserId=" & Uld  & ""
   Set rsResults = Con.Execute(strSQL)
        ba =rsResults(0)

  sSQL = "SELECT bulan  FROM personaldetails WHERE UserId="
   sSQL= sSQL & Uld & ""

Set Results = Con.Execute(sSQL)
      c=Results(0)

 QL = "SELECT tahun  FROM personaldetails WHERE UserId="
   QL=  QL & Uld  & ""

   Set Rst = Con.Execute(QL)
         d=Rst(0)

   e=(d + 1)
```

```
mL = "SELECT [File_No] FROM premis WHERE UserId="
    mL=  mL & Uld  & ""
    Set Rnt = Con.Execute(mL)
            h=Rnt(0)


nL = "SELECT coregis  FROM premis WHERE UserId="
    nL=  nL & Uld  & ""


Set Rlt = Con.Execute(nL)
            i=Rlt(0)



' execute the SQL command

CML="INSERT INTO renewal(UserId,File_No,coregis,premis, bulan,tahun)"

CML = CML & "VALUES(" & Uld & "," & h & "","& i & "","" & ba & "","" & c & "","
& e & ")"


Set R = Con.Execute(CML)

Response.write"<p><b><font size='4'><font color='#0000FF'>You Have
Successfully Submitted Your Application To Us.<BR>Your application Status
And Payment will be notified via email.</b></p>"

%>


<p align="center"><a href="../index.asp"><img border="0"
src="../images/home.gif"></a></p>
</body>

</html>
```